# THE IRON TRADE REVIEW

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### Youngstown, Ohio

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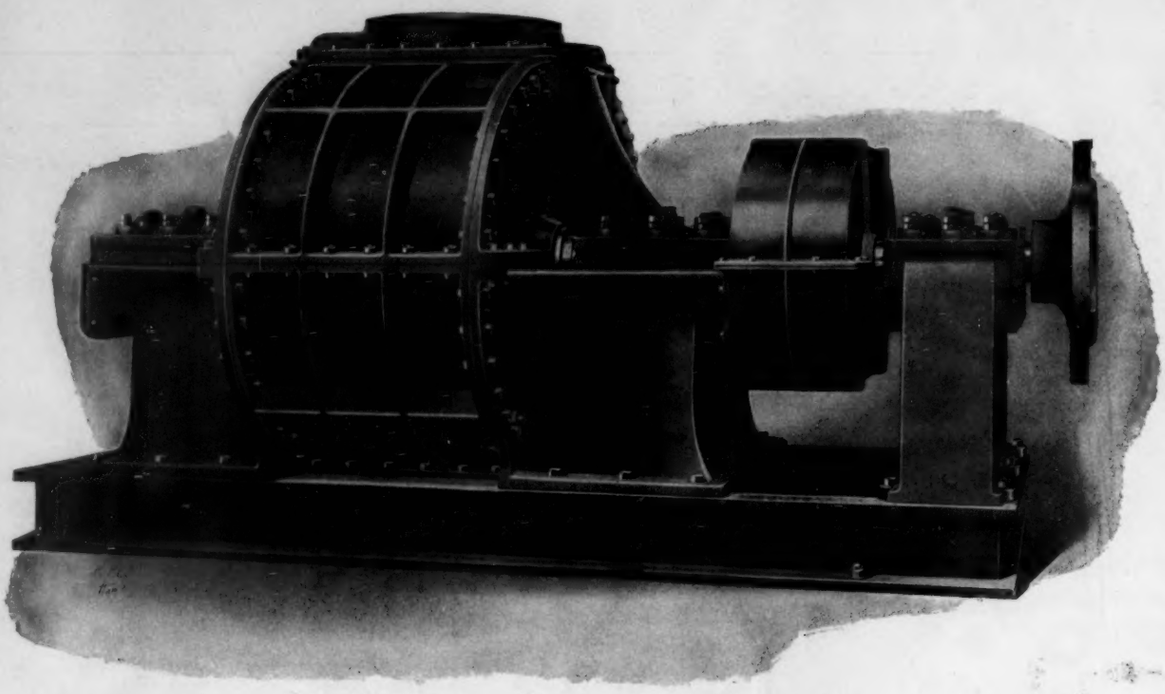

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THE IRON TRADE REVIEW

Vol. LVIII Cleveland, January 13, 1916 No. 2

# Mills Fail to Meet Heavy Demand

## And Some Plants Are Closed for Lack of Material—Foreign Buyers Have Trouble in Placing Orders—Fair Pig Iron Buying

THE inability of plate manufacturers to give satisfactory delivery of their product is shown in a striking manner by the fact that several companies in the east which use plates in manufacturing have been compelled to close because they could not obtain material. With order books filled as they seldom have been, these companies must remain idle for an indefinite time. The filled-up condition of the mills is also shown by the trouble which the representatives of foreign governments are having in placing additional orders. An inquiry for 6,000 tons of screw stock for shipment to France, which has been pending in Cleveland, has been withdrawn on account of inability to obtain a promise of delivery prior to July 1. French buyers in New York have been quoted 3.25c, mill, on 100,000 tons of large rounds for delivery during the last half of the year. Pressure for contracts is very strong on the part of large consumers, but mills are slow to take on additional tonnages. In some centers, slightly easier conditions, with slower specifying, are attributed to the fact that deliveries since Jan. 1 are, to a large extent, of materials from $5 to $12 higher than the prices made on materials delivered prior to Jan. 1. This slowing-up of specifications is welcomed, but it is not likely to continue long.

**Pig Iron**

Heavy shipments continue to be made of pig iron, particularly in eastern territory and the markets are strong throughout the country. In New York and the central west, there is more buying for the last half of the year. but the volume of business is not large. Speculation in warrants in Alabama still checks the upward tendency of southern pig iron.

**Ferro Manganese**

The ferro-manganese situation is more serious, owing to the possibility of the Suez canal being captured by the Germans, higher freights and very high prices on manganese ore. Ferro-manganese on contracts has been advanced $15 and is now selling at $125, tidewater, while for prompt delivery as high as $150 has been paid. Indian manganese ore has been sold at 68 cents per unit, tidewater, probably the highest price ever made. The rate of freight on this ore was 110 shillings.

**Machinery**

Russia continues to be the heaviest buyer of lathes and other machine tools, but with the exception of the demand from that country, inquiry is largely from domestic sources. Munition makers in this country and abroad are for the most part well-equipped and probably will not figure very actively in the market during the next few months. Buying of machine tools by the rail-

**Strike Effects**

The strikes in the Youngstown district, resulting in a number of blast furnaces being banked, have caused temporary weakness in the price for spot furnace coke, but the labor troubles have not caused serious results in the market. Consumers of semi-finished materials depending upon the Republic and the Youngstown Sheet & Tube plants were fortunately well supplied, but the loss of production will be felt later in the semi-finished material market. The loss in production of pig iron due to the strike will be reflected in the statistics for production for this month, which may for that reason be slightly less than the output for December.

**British Market**

Our reports from Birmingham, Eng., state that the government proposal to fix a maximum price for Cleveland pig iron is not received with much favor. Foundry iron in England is quoted at $18.42, and bessemer at $31.80. The scarcity of billets is serious. A round tonnage of American billets has been offered to Birmingham buyers at $60, but this is $4.80 above the British prices and it does not seem likely that sales will be made. Black sheets are quoted in England at $76.80, and galvanized at $124.80. Labor is so scarce in Sheffield that it has become necessary to employ women to load shells into wagons.

# THE OPEN HEARTH

## The East Youngstown Riot

ALTHOUGH the scenes enacted at East Youngstown last Friday night were highly disgraceful, there are some facts about them that it is pleasant to record. Whether the strike was instigated as a part of the foreign propaganda against American manufacturers of munitions, we do not know, but it is clear that the trouble was caused by men of foreign birth and it is understood that few, if any, of them are American citizens. If it can be legally done, these rioters of foreign allegiance should be deported. American Federation of Labor agitators were guilty of some meddling, but the violence was due almost entirely to liquor, which flowed freely, while the mayor of East Youngstown refused, for a time, to close the saloons in spite of the request that he do so made by the sheriff of Mahoning county.

No company in the valley has treated its men more generously than have the Youngstown companies involved, and the action of a very large percentage of men above the rank of common laborers in remaining loyal to the companies is highly graitfying. Unfortunate as is the loss of life and property, due to the outrages committed by drink-frenzied men, a desirable result will be the wiping out of the saloons which have caused so much trouble in Mahoning county. It is perfectly safe to predict that this will be done as soon as the people get another chance to vote on the saloon question.

To Governor Willis, officers of the national guard and some brave citizens who took things into their own hands, great credit is due, but the failure of the mayor of East Youngstown to close the saloons promptly and the weakness of some other people in authority deserve severe condemnation. The national guard brought the return of order almost as quickly as the drunken men started the rioting.

## The New Duluth Plant

THE OPENING of the new plant of the Minnesota Steel Co., a subsidiary of the United States Steel Corporation, at Duluth, Minn., broadens the field of steel operations in the west. Readers of *The Iron Trade Review* are familiar with this newest plant of the Steel Corporation from the full description in its issue of Nov. 13, 1913, which fully covered the equipment and practice.

At present, the plant is producing only billets, which are being shipped to the Bayview plant of the Illinois Steel Co., at Milwaukee, for rolling. Shortly the finishing mills will be in operation and the steel then will be rolled there. This plant will give the Illinois Steel Co. greater elasticity in handling its orders. Material which can be rolled and shipped more economically from Duluth than from Chicago will be scheduled for the mills at the head of the lakes, while other orders on which shipment can be made more conveniently from Chicago will be rolled there.

The entry of this plant into the western field extends the field of influence of the Steel Corporation further to the west and will expedite delivery of material in the territory easily reached from the head of the lakes.

## Directed Dynamics

ALTHOUGH peace as yet lies hidden in the mists of a distant future, the minds of financial and industrial leaders in the United States already are grappling with the problems of reconstruction. That the close of the war should find this country equipped to assert itself more effectively in the world's affairs is conceded. Also it is generally agreed that our "place in the sun" will grow in the ratio our export trade expands. But in our efforts to obtain and hold a larger share of international trade we show an inclination to discount Europe's competitive abilities. We must not forget that one of the curious by-products of the present welter of destruction is a tangible increase in the productive capacity of the nations at war, and that in the days to come it will be necessary to combat this accelerated production to hold our hard-won trade frontiers. The details of Europe's amazing growth in vitality and its probable effects were set forth in the leading article in our last issue. The problem also is discussed in a recent issue of *The Americas,* published by the National City Bank, New York, in which the whole question is summed up in the epigrammatic statement—"It is dynamics that counts in competition." But America has no lack of dynamics. What we need is more closely-knit organization and co-operation all along the line, so as to more effectively direct our energies.

## Why it is Popular

THE statistics of production of steel last year have not yet been compiled, but will doubtless show continued increase in popularity of the open hearth process, which, since 1905, has made wonderful strides in tonnage produced, and, beginning with the year 1908, has outstripped all other processes of steel manufacture. This process has come into such favored use not only by reason of its unrestricted possibilities as to available ore supply, but by reason of its amenability to greater control—it being possible to take samples at frequent intervals so as thoroughly to test and bring the metal to its

# THE OPEN HEARTH

required standard before being poured into ingot molds. Then, too, with this process the dangers of over-oxidation are minimized, compared with other processes, thereby insuring a more reliable and uniform product. The open hearth furnace, therefore, by reason of its basic efficiency and feasibility has far outstripped its most formidable competitor, the bessemer converter, and there is no possibility of its having a "near running mate" in the near future for the manufacture of steel in great quantities to supply the ever-increasing demands of the world. The electric furnace is a competitor of the crucible rather than of the open hearth in the manufacture of steel of high grade for tools, cutlery and intricate machine parts.

## A True Patriot

IT'S GREAT to be elected a congressman and sent off to Washington in a blaze of glory. It's not so great to sit in the legislative halls month in and month out, with never a chance to put a dent in the nation's history, except such slight abrasions as are consigned to a blase audience, consisting only of the *Record* linotype operator. Many incipient Websters who arrived in congress with high hopes were denied the opportunity of running the country for so long that they finally gave up and quit, as soon as pay checks stopped coming.

There happen to be a few others who believe in modern methods. Impatient of wriggling laboriously into that charmed circle within Mr. Speaker's range of vision, such a one selects a fat, helpless, resounding punching-bag of a grievance. This is preferably an issue of some significance to one's own particular parishioners, and of at least mild interest to the nation at large. Having hung up the grievance in a conspicuous place, our congressman goes after it thunderously. The resultant noise draws news-correspondents. What could be simpler? The aggrieved statesman is quoted far and wide. Given a modicum of respect for the libel laws, a gift for generalities and a noisome vocabulary, fame may be made to order.

## Should be "Scrapped"

PRESENT interest in the development of efficiency in technical schools, with a view to making the courses thoroughly modern, practical and immediately serviceable, recalls conditions not so admirable, which prevail in many manual training departments of the ordinary high school. General criticism cannot be applied, as the methods in vogue differ from city to city. There is, however, ground for the belief that a training which is designed to make the student more valuable as a handicraftsman succeeds only in giving him a vague and unreliable smattering of information on half-a-dozen topics. For instance, a boy is given a few score hours of desultory training in carpentry and woodturning. He constructs a grandfather clock, a tabouret, and a napkin ring. A little later, he is permitted to make "patterns" and to cast them—with plaster of Paris, ramming the molds by hand! Forging is taught by the aid of small hand forges and blacksmiths' anvils. The whole course is buttered with a little mechanical drawing. In the light of modern manufacturing methods, such as confront a young man when he takes up an industrial career, the whole affair seems a waste of time. It might be a help to a future "desk man", who will some day make a wife's heart glad by nailing up a shelf without accident; but a hindrance to him who seeks knowledge of manufacturing processes as they exist today, not as they were yesterday. Such "manual training" is obsolete.

## Was It Economy or Efficiency?

THE necessity for economy, we have learned, kept the railroads from buying equipment. For proof of this, we point to the heavy buying movement of the past few months. But President L. F. Loree, of the Delaware, Lackawanna & Western railroad, furnishes a few figures which tend to shake our belief in the plea of economy.

Comparing 1900 with 1914, we learn that while freight receipts on his road advanced from $15,135,100 to $28,448,000, the total number of freight cars engaged in the traffic increased less than a thousand, from 27,287 to 28,241. The average number of tons carried in one freight train in 1900 was 325, and in 1914 it was 625 tons.

The ability to carry twice as much freight with only a negligible increase in cars resulted from improvements both in methods and equipment. The freight cars of today have 60 per cent greater carrying capacity than those of 1900. At that time, an average box car carried 40,000 pounds. Today the average capacity is 70,000 pounds. The need for heavier rolling stock brought about better roadbeds, stronger bridges, heavier rails, and larger engines.

Today each train requires more steel than the train of 1900, but has the tonnage of steel increased in direct proportion to the freight-handling ability of the carriers? The 35-ton car of today not only carries 60 per cent more freight than the 1900 car, but carries that volume of freight more times during the year. The railroads, in learning economy, had efficiency thrust upon them.

In efficiency, therefore, as much as economy, we may find the real reason for the railroads' ability to keep out of the market.

## Prices Present and Past

*Quotation on leading products January 12, average for December, 1915, average for October, 1915, and average for January, 1915. Prices are those ruling in the largest percentage of sales at the dates named.*

| | Prices Jan. 12, 1916. | Aver. for Dec., 1915. | Average for Oct., 1915. | Aver. for Jan., 1915. |
|---|---|---|---|---|
| Bessemer pig iron, Pittsburgh.. | $21.45 | $19.85 | $16.95 | $14.70 |
| Basic pig iron, Pittsburgh..... | 19.45 | 18.55 | 15.95 | 13.45 |
| No. 2 Fdy. pig iron, Pittsburgh | 19.95 | 18.85 | 15.57 | 13.70 |
| Northern No. 2 Fdy., Chgo.... | 18.50 | 18.10 | 14.44 | 13.00 |
| Lake Superior Charcoal, Chgo.. | 19.25 | 19.15 | 16.25 | 15.75 |
| Mall., Bess., Chgo..... | 19.00 | 18.10 | 15.12 | 13.00 |
| Southern No. 2, Birmingham... | 14.50 | 14.13 | 11.75 | 9.50 |
| Southern Ohio No. 2, Ironton.. | 18.00 | 17.00 | 14.88 | 12.75 |
| Basic, eastern Pa..... | 19.50 | 18.00 | 17.50 | 13.50 |
| No. 2X Virginia furnace..... | 17.25 | 17.00 | 14.00 | 12.50 |
| No. 2X foundry, Philadelphia... | 19.75 | 19.25 | 15.00 | 14.25 |
| Ferro mang., Balti., (prompt).. | 125.00 | 100.00 | 105.00 | 68.00 |
| Bessemer billets, Pbgh..... | 34.00 | 29.60 | 25.50 | 19.50 |
| Bess. sheet bars, Pbgh..... | 34.00 | 30.80 | 25.50 | 20.00 |
| Op.-h'th sh. bars, Pbgh..... | 35.00 | 30.80 | 26.50 | 20.00 |
| Open-hearth billets, Pbgh..... | 35.00 | 30.20 | 26.50 | 19.50 |
| Steel bars, Chgo..... | 2.19 | 1.97 | 1.59 | 1.29 |
| Steel bars, Pittsburgh..... | 2.00 | 1.74 | 1.41 | 1.10 |
| Iron bars, Philadelphia..... | 2.259 | 1.959 | 1.559 | 1.10 |
| Iron bars, Cleveland, local del'y. | 2.00 | 1.75 | 1.39 | 1.15 |

| | Prices Jan. 12, 1916. | Aver. for Dec., 1915. | Average for Oct., 1915. | Aver. for Jan., 1915. |
|---|---|---|---|---|
| Iron bars, Chgo. mill..... | $1.75 | $1.70 | $1.37 | $0.98 |
| Beams, Chgo. ..... | 2.19 | 1.97 | 1.59 | 1.29 |
| Beams, Pittsburgh ..... | 2.00 | 1.959 | 1.41 | 1.10 |
| Beams, Philadelphia ..... | 2.159 | 1.959 | 1.609 | 1.25 |
| Tank plates, Pittsburgh..... | 2.00 | 1.74 | 1.42 | 1.10 |
| Tank plates, Chicago..... | 2.19 | 1.97 | 1.55 | 1.28 |
| Tank plates, Philadelphia..... | 2.409 | 1.759 | 1.609 | 1.25 |
| Sheets, blk., No. 28, Pbgh..... | 2.60 | 2.54 | 2.05 | 1.80 |
| Sheets, blue an., No. 10, Pbgh. | 2.40 | 2.23 | 1.60 | 1.30 |
| Sh., galv., No. 28, Pbgh..... | 4.75 | 4.75 | 3.50 | 2.77 |
| Wire nails, Pittsburgh..... | 2.10 | 2.02 | 1.76 | 1.55 |
| Connellsville fur. coke, contr... | 2.35 | 2.35 | 2.25 | 1.69 |
| Connellsville fdy. coke, contr... | 3.00 | 3.00 | 2.48 | 2.25 |
| Heavy melting steel, Pbgh..... | 17.50 | 17.50 | 14.00 | 11.62 |
| Heavy melting steel, east'n Pa.. | 17.00 | 16.00 | 15.00 | 10.00 |
| Heavy melting steel, Chgo..... | 15.50 | 15.40 | 11.56 | 8.87 |
| No. 1 wrought eastern Pa..... | 22.00 | 20.00 | 16.00 | 11.75 |
| No. 1 wrought, Chgo..... | 15.50 | 15.15 | 10.68 | 8.81 |
| Rerolling rails, Chgo..... | 17.75 | 14.31 | 13.15 | 9.50 |
| Car wheels, Chgo..... | 14.75 | 14.75 | 11.75 | 10.00 |

(For Additional Prices See Page 162.)

# Very Heavy Shipments of Pig Iron

### Remarkable Record in the East in Spite of Troubles—More Activity in Buying Last Half Iron in Central West

Philadelphia, Jan. 10.—Extraordinarily heavy shipments of pig iron have marked the close of the past year. As now shown by completed statistics this has been true notwithstanding some tie-ups of furnaces by coke delays which still continue. Instead of the usual December increase in stocks which has been noted in eastern Pennsylvania, the figures of the Eastern Pig Iron Association revealed a slight decrease and this was in the face of a much larger list of active furnaces compared with a year ago. Total unfilled orders showed a further increase. In Virginia stacks, there was a net decline of 18,000 to 20,000 tons in December despite the fact that production was 1,000 tons greater and shipments were 5,000 tons heavier in December than in November. Orders also increased. The bookings of the leading Virginia producer on Jan. 1 were approximately 230,000 tons. The market has entered the new year with quietness. Prices show little change and are very strong. Eastern Pennsylvania foundry is at about $19 to $20, furnace, for No. 2X and in central Pennsylvania there still are some sellers at $18 to $18.50, furnace. This makes a going market of about $19.75 to $20.25, Philadelphia, for first half. Some Buffalo No. 2X for last half was sold in this territory this week at $19, furnace, or $21.58, delivered. The buyer took other local and higher phosphorus brands at lower prices. Active Virginia sellers are quoting from $17.25 to $18, for No. 2X, the latter for last half. High manganese Virginia iron has been sold at $19, furnace. A Pottstown, Pa., iron maker who last week inquired for several thousand tons of puddling forge decided not to buy. A Delaware river pipe maker took 1,000 tons of early eastern Pennsylvania forge at $18.50, delivered. A local buyer took about 1,000 tons of Buffalo malleable second quarter at $20.58, delivered, or $18, furnace. A small tonnage of eastern Pennsylvania basic was sold to a Perth Amboy, N. J., consumer for second and third quarters at $19.50, delivered. This price about represents the eastern Pennsylvania market. The Standard Steel Works Co., Burnham, Pa., took 6,000 tons of first half basic from the valleys at $18 to $18.25, furnace, or about $20.25 to $20.50, delivered. Low phosphorus is quieter. About 1,000 tons of standard iron for second quarter were sold the past week at $30, eastern furnace. The Dora furnace in Virginia resumed Jan. 5, the No. 3 Hokendauqua will go in about Jan. 15, while one of the Central Iron & Steel Co. furnaces at Harrisburg is preparing to resume after a long idleness.

#### Pig Iron Quiet

Pittsburgh, Jan. 11.—The pig iron market in western Pennsylvania and eastern Ohio has been quiet thus far this year. Labor trouble, which closed the plants of the Youngstown Sheet & Tube Co. and the Republic Iron & Steel Co. at Youngstown, appears to have affected sentimentally the market for crude and finished products, but prices have not yielded. Shipments of pig iron to both plants were summarily cut off, but no surplus of iron is reported. The Mesta Machine Co. is understood to have closed for 1,000 tons of bessemer iron and 1,000 tons of No. 2 foundry for shipment the second half of the year, at $21 and $20, valley, respectively. No other sales of importance are noted. The Carnegie Steel Co. last week blew in its Neville furnace, which had been idle for many years. Edith furnace is scheduled for the torch at an early date.

#### Activity in Last Half Iron

Cleveland, Jan. 11.—There is considerable activity in pig iron outside the immediate Cleveland district and sales are being made on a basis of

(*For complete prices see page* 162.)

$18.75 to $19, Toledo; $19, valley, and $19, Cleveland furnace, for No. 2 foundry. It has been reported, however, that there has been some shading of $19 in the valley, and at Buffalo sales are being made as low as $18, that district, as usual, taking the lead in naming low prices. Business is coming freely to sellers, who, as a rule, are not making any efforts to encourage buying at this time.

### Northern Iron Firm

Chicago, Jan. 11.—Northern pig iron remains firm at $18.50, Chicago furnace, for No. 2 foundry, and $19, furnace, for malleable. Inquiry is good and includes round lots for last half and small lots for immediate delivery, buying for entire first half delivery being of less volume. The prompt demand is most encouraging and indicates increasing business on the part of melters.

In the latter sales, much high silicon iron is being shipped and full premium is being realized on this element.

Southern iron is being sold largely in this territory, prices being on an equality as soon as a slight freight rate from local furnaces is added and the higher silicon content of the Birmingham iron makes it desirable to many melters. For first half delivery some southern iron is obtainable at $14.50, Birmingham, with most sales at $15, Birmingham. For last half, $15.50 to $16.50, Birmingham, is being asked, with sales mostly at the minimum.

Silveries from southern Ohio are quoted at $25, furnace, for 8 per cent, a lower figure prevailing a fortnight ago apparently having disappeared. Ten per cent bessemer silveries are quoted at $28, furnace.

Minimum quotations on Lake Superior charcoal iron have been advanced somewhat from former levels. While one interest still asks $21.25 to $22.25, Chicago, another maker quotes $19.75 to $20.25, Chicago. On a recent competition in which an Indiana plow maker took 1,000 tons or more, a lower price is believed to have been made in competition with coke iron from Chicago and Toledo.

Low phosphorus iron apparently is firm at $34 to $35, Milwaukee furnace, the market having steadied appreciably.

### Sales Are Light

Cincinnati, Jan. 11.—The pig iron market is moving slowly, with sales and inquiries light and scattered. Southern No. 2 foundry iron can still be had from one, and possibly two stacks at $14.50, Birmingham basis, for first half delivery, and $15 for the last half of the year. Other southern furnaces are holding firmly at from $15 to $15.50, Birmingham basis, for the first half, and from $15.50 to $16 for the last half. Transactions of resale iron have no bearing upon the market at present. Southern Ohio No. 2 foundry iron is unchanged at $18, Ironton basis, for the first half, and from $19 to $19.50 for the second half. Silvery iron is quoted at $25, furnace, for 8 per cent silicon, for the second quarter, and a premium is being asked for the first quarter. A tentative inquiry for 10,000 tons from Louisville, Ky., has been withdrawn pending further transactions before this business can be placed.

### Market Not Brisk

St. Louis, Jan. 11.—Purchases of pig iron have not been as brisk since the turn of the year as some local dealers expected, and were limited last week to perhaps 1,500 tons composed of small lots. There is virtually no inquiry on the market today, but prices are firm. Southern No. 2 pig iron is held at $15.50 to $16 for first half delivery, and some has been sold at the higher figure. Northern iron is firm at $18.50, Chicago, for No. 2 and at $19 for malleable. Malleable and No. 2 are held at $18, Ironton.

### Some Speculative Iron

Birmingham, Ala., Jan. 11.—There is still some lower priced iron being offered than $15 to $15.50 per ton at the furnace—in the way of certain warrants, etc. One lot was offered at $14.50 per ton for speculative purposes. Sales during the week were comparatively light, due to natural causes which always follow the holidays. One company sold 1,300 tons at $15.50 for the first half delivery; another company sold 850 tons at the same figure. A 1,000-ton lot is now pending for delivery through second half at $16 per ton at the furnace. Still another interest reports the same of 2,500 tons on basis of $15.50 for first and second quarter delivery. It is not likely that a good round tonnage would be turned down at $15 per ton for the first half, on a bona fide order. Same conditions prevail here as elsewhere—viz.: that conditions are too uncertain for a producer not to consider as attractive price of $15 per ton at the furnace, even through the entire year, yet that feeling of "something liable to drop" holds them aloof from backing their judgment. A majority of the producing interests are quoting $15 to $15.50 per ton at the furnace for first half delivery, and $15.50 to $16 per ton for last half delivery. One company reports that it is only authorized to quote beyond the first half as particular business offers, then subject to confirmation.

*(For complete prices see page 162.)*

## More Buying

Cleveland, Jan. 11.—Increased activity in iron ore sales has developed during the past week and one firm has sold 200,000 tons. Owners of mine property whose ore is not sold by any of the large ore firms are showing anxiety as to how they will dispose of the ore and how they will get boats to carry it to lower lake ports, if they succeed in selling it. Opinions differ as to whether there will be enough vessel capacity to take care of the ore which will be ready for shipment.

## Pipe Advanced

Pittsburgh, Jan. 11.—Under date of Jan. 4, the National Tube Co. advanced standard and reamed and drifted steel pipe $2 a ton and oil country goods were put up $1 and $2 a ton. Extra strong and double extra strong steel pipe was not affected. New discounts offered by the National company have been adopted by independent manufacturers. Makers of wrought iron pipe have advanced prices $4 a ton on all sizes and weights. Under date of Jan. 7, the National Tube Co. advanced prices of steel boiler tubes $4 a ton. Wrought iron boiler tubes also were advanced $4 a ton. Demand for structural goods is moderately heavy. Aside from the Philadelphia Co.'s order for 11,000 tons of iron oil country goods, briefly mentioned a week ago, no large tonnages have been placed in this district.

## Nuts, Bolts and Rivets

Pittsburgh, Jan. 11.—To meet advances in the price of steel, some manufacturers of nuts and bolts last week put up prices about 10 per cent; rivets were advanced $2 a ton to 2.60c and 2.70c for structural and boiler rivets, respectively. The new prices on nuts and bolts are not adhered to by all, but probably will be soon established. Demand for these products is described as heavy. While plants are operating on double turn schedules, yet they are unable to meet the heavy demand of consumers.

The Union Spring & Mfg. Co., Pittsburgh, has installed a 4-ton Heroult electric furnace in its plant at New Kensington, Pa.

# Ferro Prices Are Very High

## English Product Sold at $150, Seaboard—Quotations on Manganese Ore Ascend to Highest Point on Record

New York, Jan. 11.—Ferro-manganese, under the advance of $15 to $125, seaboard, posted by English makers on Jan. 8, now is quoted for future contracts at a price well above any previous period since the Russian-Japanese war. Spot ferro-manganese also has risen to a new high level and a cargo of English was sold in eastern territory during the week at $150, seaboard. There is practically no spot material to be had and present prices are purely a question of how much the holder insists on receiving for the material and how badly the consumer must have it. Domestic makers of ferro-manganese have moved up their price to accord with the new English schedule.

Increased difficulties in the transportation of manganese ore from India, due to German menace of the Suez canal route, is believed to be the effective factor in the continued advance of English metal. These cargoes of ore now are being diverted about the Cape of Good Hope, entailing both a longer voyage and a much higher freight cost. The advance in the price of English ferro-manganese, since the Indian ore situation became more complicated, has amounted to $25 in about two weeks. On Dec. 27, the price was raised to $110, seaboard, after the market had remained unchanged at $100, seaboard, since May 14. Even at the new price of $125, seaboard, several of the important English makers advise that they are unable to book any new tonnage except for last half shipment.

Large steelmakers and other consumers of ferro-manganese, apparently, are becoming more thoroughly aroused to the seriousness of the present reduced and indefinite imports from England, especially in view of the tremendous extent of present necessity. A number of these companies are making new contracts for future delivery, trusting in the ability of English makers to fulfill these shipments. Several thousand tons of inquiry now are in the market, including 1,000 tons for the last half for a Youngstown steelmaker. There are several 500-ton lots current. No contracts yet are reported by sellers at the new price of $125, seaboard, but a number were negotiated prior to the advance at $110, seaboard. Recent arrivals of about 500 tons have been brought by the Quernmore at Baltimore and the Asian at New Orleans. The Dominion with 300 to 500 tons is about to dock at Philadelphia.

Spiegeleisen is held at a minimum of $30, furnace, but there is no metal available for early delivery.

### Highest Ever Known

Philadelphia, Jan. 11.—Indian manganese ore has been sold to consumers in this country at the highest price ever known. A cargo of about 6,000 tons has been taken by a Pennsylvania steel maker at approximately 65 cents per unit at tidewater. The price largely was due to the extraordinary freight rates, as the charter from Bombay to the Atlantic receiving port was 110s. Some consumers have been reporting they can buy Indian ore at 50 to 52 cents, tidewater, but in view of the cargo recently sold, it is thought that there must be some special conditions to such offers. Another sale of about 1,500 tons of Brazilian manganese ore has been made to an eastern steel company at 58 cents per unit at seaboard. This also is a new high price for this ore. It is reported that some Brazilian ore is available at 44 cents per unit at southern ports. There has been some new offering of Cuban manganese ore and one seller has quoted 52½ cents per unit at tidewater for material containing 17 per cent silica. Another seller has been offering 4,500 tons in the market.

### Ferro Higher at Pittsburgh

Pittsburgh, Jan. 11.—Sellers of 80 per cent ferro-manganese have advanced prices sharply since Jan. 1. Dealers are asking from $125 to $150, seaboard, for this material, but no important sales have been made this week. The American Manganese Mfg. Co. plans to blow in its second furnace at Dunbar, Pa., at an early date. The stack will operate on ferro-manganese and spiegeleisen. Spiegeleisen is being sold at $30 a ton and a number of attractive tonnages have been involved in sales since Dec. 31. Demand for 50 per cent and lower grades of ferro-silicon continues heavy, but prices are unchanged in position. Tungsten ore is selling at unprecedented high prices. An acute shortage of this material is reported as a result of the tremendous demand for tool steel.

(*For complete prices see page* 162.)

# Coke Declines

### Owing to Youngstown Strike—Prompt Prices Are Lower

Pittsburgh, Jan. 11.—The declaration of railroad embargoes against the shipment of coke to the Youngstown Sheet & Tube Co., Youngstown, blast furnaces of which were banked as a result of the strike, caused a depression in the market for Connellsville fuel which dropped to $2.50, ovens, for prompt delivery early this week. Fairly heavy tonnages of spot coke were offered yesterday at $2.50, but consumers manifested no interest in the market. It is reported that the Republic Iron & Steel Co., which also is affected by the strike, offered some by-product fuel which was on track when blast furnaces were banked. Cokemakers had expected a shortage of fuel this week as a result of the observance of religious holidays by laborers in the Connellsville regions. The market for 72-hour coke is unchanged in position. A lower lake front blast furnace interest, which had entered the market for contract fuel, is figuring in the spot market. Production of Connellsville coke in 1915 was 17,921,216 tons, according to figures compiled by the *Connellsville Courier*. In 1914 the production was 14,075,638 tons; in 1912 and 1913, production ran slightly above 20,000,000 tons.

### Spot Furnace Scarce

Cincinnati, Jan. 11. — Spot furnace coke has become so scarce that it is now obtainable only in special lots and at fancy prices. Demand for spot foundry grades is also good, but is not as heavy as that for furnace fuel. Shipments on contracts continue very heavy. The tonnage of coke produced by southern ovens each week is not sufficient to fill all specifications for immediate delivery from consumers. Prices show no change for contract shipment in either the Wise county, Pocahontas or New River districts.

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# New Bullard Plant

The Bullard Machine Tool Co., Bridgeport, Conn., has made a contract with the Turner Construction Co. for a reinforced concrete building, 268 x 50 feet, four stories. The first story will be what might be termed two floor height, and will be served by cranes operating in the two sections which run the entire length. The second and third floors will be utilized as machine rooms, while the fourth floor will be occupied by the management, shop executive and drafting department.

# Sell Bars at High Prices

## Many Mills Unwilling to Make Contracts—Representatives of Belligerents Have Difficulty in Placing Orders

Philadelphia, Jan. 10.—Some leading steel bar makers will not quote at present on contracts for fixed periods for which there are last half inquiries, and are confining their prices to requirements for specific work. Under these circumstances, they have sold steel bars at 2.25c and 2.35c, Pittsburgh, for delivery several months ahead. The nominal contract prices on steel bars remain at a minimum of 1.85c to 1.90c, Pittsburgh, for second or third quarters. Some makers remain completely out of the market. One mill which has been offering odds and ends from a stock list accumulated over a long period, has been having no difficulty in selling at 2.25c, mill. Heavy inquiries for large rounds for munition making for last half continue in the market, but very few contracts have been closed and prices are unsettled. The Bethlehem Steel Co. has out a new inquiry for 5,000 to 6,000 tons of 3½-inch for delivery by March and another eastern Pennsylvania company wants 500 to 1,000 tons of the same diameter for early shipment.

### Prices for Export Material

New York, Jan. 11.—Representatives of the French government, who have been inquiring for heavy tonnages of large rounds and other shell material, have been quoted 3.25c, mill, for 100,000 tons of 3 to 6-inch rounds for all-year delivery, it is reported. In view of the known willingness of some companies to entertain such business at this figure or lower, this statement is regarded in the trade as authentic. Some mills, however, still talk of 3.50c, mill, or higher. Few contracts yet have been closed, but negotiations are going forward steadily.

### Demand Strong

Chicago, Jan. 11.—Little comment is possible on the situation in steel bars and other finished products. Mills for the most part have almost nothing to sell and quotations are largely nominal. Large producers are quoting 2.04c, delivered, Chicago, but have no tonnage to dispose of at any price. Smaller mills with some moderately prompt capacity are obtaining large premiums over this figure.

Specifications are being sent in promptly and practically no tonnage was cancelled at the end of the year. Shipments are in much less volume than specifications, so that delivery is being deferred still further.

Hard steel bars from re-rolled rails are firm at 1.80c to 1.85c, Chicago, with prospects of a scarcity for construction work in the spring.

### Steel Bars Strong

Pittsburgh, Jan 11. — As briefly reported in the Jan. 6 number of *The Iron Trade Review*, steel bars are being held at 1.85c, or $1 a ton above the figure prevailing just before Jan. 1. Material for nearby shipment, however, is selling at a range from 2.25c to 2.50. Deliveries of steel bars are deferred from four to seven months. Numerous inquiries for rounds for the manufacture of shrapnel are reported. Iron bars are being held at 2c and above.

### Can't Make Delivery

Cleveland, Jan. 11.—The steel bar market is exceedingly strong and mills are finding themselves unable to take all of the tonnage offered. Some very desirable tonnages have been rejected. Inquiry was pending for 6,000 tons of screw stock for export to France, but the representative of the French government who was negotiating found it impossible to get any quotation for delivery during the next six months and has decided not to make any further efforts for the present to place the business. The tonnage was for cold drawn steel from 2 inches down to 1 inch. Bar iron is firm, but Cleveland makers have turned out about all the bars they can without making additional purchases of scrap, and they are not anxious to do this at present, owing to the high prices prevailing.

### Eastern Bar Iron Jumping

Philadelphia, Jan. 10.—A second advance of $2 a ton in less than a week has been announced in bar iron by eastern makers, the new figure being 2.10c, Pittsburgh, or 2.259c, Philadelphia, effective Jan. 6. A previous advance to 2.00c, Pittsburgh, was announced Dec. 31. Business is very heavy and active. Where especially quick delivery can be made, liberal premiums over the official price are realized by eastern mills.

### Bar Iron Steady

Chicago, Jan. 11.—Bar iron makers are comfortably situated and prospects are excellent for continued large tonnage on mill books. Quotations remain at 1.75c to 1.80c, Chicago mill, with tonnages being booked at both levels, according to their attractiveness. Mills have sufficient tonnages on their books to carry them well through first quarter and additional business is offering, sufficient to extend this limit steadily.

### Hoops, Bands and Shafting

Pittsburgh, Jan. 11.—Steel hoops were not advanced last week by leading makers, despite contrary reports. Hoops are offered at 2c. Bands were put up $1 in price a week ago and now are held at 1.85c. Deliveries of hoops and bands are deferred from four to six months.

Cold rolled steel shafting is quoted at 45 per cent off the list for carload lots and at 40 per cent off the list for less than carload tonnages. Manufacturers of this material are unable to promise additional tonnages for delivery the first half of this year.

Cold rolled strip steel products have been advanced to 3.75c base, or $5 a ton above the previously prevailing nominal price. Manufacturers of steel chain on Jan. 2 advanced prices $7 a ton to 4c for ⅜-inch proof coil chain.

(*For complete prices see page* 162.)

## Wire Mills Swamped

Pittsburgh, Jan. 11.—Despite the fact that prevailing prices of wire products are the highest quoted in many years, talk of further advance in price is heard. Mills are not attempting to book additional tonnage for shipment the first half of this year and it is not likely that prevailing prices will be offered for delivery after July 1. Wire nails are firm at $2.10 a keg and plain wire is held at $1.95 per 100 pounds. Cut nails are quoted at $2 a keg at Pittsburgh.

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**New Additions.**—The Seneca Wire & Mfg. Co., Fostoria, O., has completed plans for a large addition to its plant. A new building, two stories and basement, 150 x 125 feet, will be erected, to be used as a packing and store room. Another building, 150 x 100 feet, one story, will be erected and used for a cleaning and coarse wire department. The present main building will be extended and other improvements will be made permitting a considerable increase in production.

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M. D. Valentine & Bro. Co., manufacturer of fire brick, Woodbridge, N. J., has distributed to its customers as a souvenir of its fiftieth anniversary, which occurred in November, a paperweight which is in the form of a miniature glazed fire brick.

# Sheet Prices

**Are Still Moving Upward—Active Demand for Blue Annealed**

Youngstown, O., Jan. 11.—Influences previously noticeable in the steel sheet market appear even more prominent this week. The unparalleled demand for blue annealed sheets and the limited capacity for this material have kept prices moving steadily upward. A week ago No. 10 gage was obtainable at 2.40c; today makers are asking from 2.60c to 2.75c, while sales have been as high as 2.85c and 3c, Pittsburgh. Sellers have a fairly large tonnage on their books and now are taking business cautiously.

Valley producers of black sheets say that demand this week has shown some falling off, while the market apparently is slightly less firm. The general cessation in galvanized sheet activity has resulted in large stocks of the lighter gages of black sheets and business in this material is highly competitive at present. Sales of the lighter gages have been made in the basis of 2.40c, Pittsburgh, for No. 28 gage. The heavier gages still are commanding 2.50c, Pittsburgh, and above. Galvanized sheets continue quoted nominally 4.75c to 5.25c, Pittsburgh, for No. 28 gage.

Export inquiry for sheets has shown a decided decrease in volume of late, and in view of the embargo, sheet makers are little concerned. It is believed that with the resumption of export shipments, foreign inquiry will come out with increased vigor.

### Strong at Cleveland

Cleveland, Jan. 11.—The sheet market continues strong, but occasionally a buyer succeeds in buying blue annealed and black sheets at what are considered fair prices for prompt delivery. Some mills which do not wish to take on additional tonnages are quoting No. 10 blue annealed at 2.75c.

### Sheet Prices High

Chicago, Jan. 11.—Steel sheets are being quoted at an unusually high level, sheetmakers being forced to pay high for sheet bars and demand is sufficient to meet conditions. Blue annealed are quoted now at 2.59c to 2.69c, Chicago, with black sheets at 2.79c, Chicago, as a minimum, and higher prices being asked by some makers who can give better delivery than the average.

Galvanized are not in demand at present prices and at about 5.00c, Chicago, consumers find it difficult to handle them at a profit.

### Sales Light

Cincinnati, Jan. 11.—Sales of sheets are not heavy and are confined chiefly to spot lots.. Mills will not sell for delivery beyond the first quarter except at good premiums. Prices are strong at 2.65c for black No. 28 gage, 5c for galvanized No. 28, and 2.25c for blue annealed No. 10 gage, all Pittsburgh basis. Warehouse prices are as follows: Black No. 28 gage, 3c; galvanized No. 28, 5.25c; blue annealed No. 10, 2.65c to 2.70c, all f. o. b. Cincinnati.

### Specifications Heavy

Pittsburgh, Jan. 11.—Specifications for steel sheets are running about 50 per cent ahead of shipments, according to statements made by several mill managers in western Pennsylvania and eastern Ohio. Deliveries are deferred from eight to 20 weeks. Prices of black and blue annealed products are higher; No. 28 gage black sheets are held at 2.60c and No. 10 gage blue annealed sheets are quoted at 2.40c. Galvanized sheets are being offered at 4.75c as a minimum for No. 28 gage. Sheet mills are operating at maximum capacity, although galvanizing departments of most plants are not producing more than 50 per cent of normal output.

### Eastern Price Still Rises

Philadelphia, Jan. 10.—Further advances by eastern Pennsylvania sheet makers have brought their schedules to a maximum level of 2.75c, Pittsburgh, or 2.909c, Philadelphia, for No. 10 gage blue annealed, and to a minimum of 2.60c, Pittsburgh, or 2.759c, Philadelphia. Despite the higher prices, their order book still grows so that practically all selling for delivery this side of July now has been shut off.

### Tin Plate Stronger

Pittsburgh, Jan. 11. — All tin plate manufacturers in western Pennsylvania and eastern Ohio are quoting $3.75 base, or $3 a box above the price adopted at the opening of the 1916 season. It is not unlikely that the price of tin plate will advance to $4, base, before the end of the first quarter. Specifications from domestic consumers are heavy and tonnages for export have been increasing in volume the last 60 days.

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# Late Sales of Basic

New York, Jan. 11.—Additional sales of eastern Pennsylvania basic iron, it is learned, have been closed quietly in this territory for third quarter delivery and these have shown that the market for that period now is at a range of from $19.50 to $20, tidewater.

(*For complete prices see page* 162.)

# Cast Iron Pipe

**Higher Prices Cause Municipalities to Hesitate**

New York, Jan. 11.—Another advance of $1 a ton has been put into effect by eastern makers of cast iron pipe, placing 20-inch class B at $27.50, foundry, or $29, New York, and 4-inch class B at $30.50, foundry, or $32, New York. New business, especially in public lettings, has not been coming out as freely as makers had expected. Apparently, the advanced prices are causing various municipalities to hesitate before issuing inquiries. Makers are predicting, however, that if these delays continue, the buyers in the end will only have to pay higher prices because of the advancing markets in raw materials. Jersey City, which recently took bids on 2,000 tons of 48-inch pipe, has rejected these tenders and will advertise anew. The United States Gas Improvement Co., Philadelphia, was the buyer of several thousand tons of 4's, 6's and 8's, of which 1,200 tons went to the United States Cast Iron Pipe & Foundry Co. The same maker took 440 tons of 4's, 6's and 8's for Haverhill, Mass. R. D. Wood & Co. was awarded 240 tons of 8's, 10's and 12's for Gloucester, Mass., at $29, delivered, and 142 tons of 8's for Binghampton, N. Y. The Standard Cast Iron Pipe & Foundry Co. received 1,014 tons of 4's to 16's for Springfield, Mass., at $31.41, delivered, for the 4's and $29.41, delivered, for the 6's to 16's.

### Conditions Improving

Birmingham, Ala., Jan. 11. — Conditions are improving at the large water pipe plants, which report prices going up, and business in hand sufficient to insure operation far into the year. They quote, per net ton f. o. b. cars at the plant, standard sizes, 4-inch, $26; 6-inch and up, $24; with $1 per ton extra for gas pipe and 16-inch length pipe.

### Cast Pipe is Firm

Chicago, Jan. 11.—Cast pipe is having something of a lull, waiting for larger cities to make up their schedules for the year. Prices are firm at the higher level established a week ago and plants are busy turning out the product. The American Cast Iron Pipe Co. was awarded 300 to 600 tons at Madison, Wis., last week. Bids were opened Jan. 12 at Elyria, O., on 500 tons and Jan. 14 at Emporia, Kans., on 600 tons.

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Col. H. P. Bope, vice president and general sales manager of the Carnegie Steel Co., Pittsburgh, is recovering from an attack of the grip. He was taken ill while in New York City last week.

# Serious Shortage of Plates

## Several Eastern Manufacturing Plants Compelled to Close on Account of Inability to Obtain Material

Philadelphia, Jan. 10.—Inability to obtain a steady supply of plates because of the badly congested order books of the mills is forcing the indefinite shut-down of several eastern manufacturing plants. One large New York state boiler maker has shut down his works and has disbanded his organization for several months at least in the face of the fact that his orders are unusually heavier and desirable. Three or four other manufacturers in the east have been obliged to follow the same course. The eastern Pennsylvania plate makers are unable to make much headway against the mass of tonnage on their books which still grows despite their opposing efforts. The result is a further narrowing of selling policies and the minimum price of 2.50c, Pittsburgh, now is quoted to only a selected few of the best customers. Some sales continue to be made even at 2.75c, Pittsburgh. Makers are declining to quote on much tonnage which in the week has included 6,500 tons for last half for New York subway, 6,000 tons for a very large buyer for second quarter, 2,000 tons for another buyer and 6,000 to 8,000 tons for Canada.

### Plates Nominally Quoted at 1.85c

Pittsburgh, Jan. 11.—The 1.85c quotation adopted a week ago by the Carnegie Steel Co. and independent manufacturers is already regarded as nominal, since mills are not booking tonnage at that figure, except for delivery at their convenience. Books for shipment after July 1, have not been opened. Material for nearby delivery is commanding from 2.25c to 2.50c and fairly heavy tonnages are being sold for prompt delivery.

### Plates Continue Higher

Chicago, Jan. 11.—Plates continue to lead finished steel products, unusual demand for car and ship building and for other purposes being much in excess of supply. Leading producers are unable to sell further tonnage and small producers are able to supply only a part of the demands, at large premiums. Warehouses are being called on heavily.

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**Three New Buildings.**—Wyman & Gordon Co., maker of drop forgings, Worcester, Mass., and Cleveland, has awarded the contract for three additional buildings at its main plant in Worcester, the value of the improvements and machinery to be installed being about $75,000. These buildings include a new heat-treating department, with additions to the shipping, testing and machine shop facilities. The additions cover two single-story structures and one two-story, all of brick and steel construction, with concrete foundations on piles.

# Rail Inquiry

### Includes Round Lots for Export—Car Buying on the Quiet

New York, Jan. 11.—More foreign inquiries for rails have come into the market, including additional lots of 50,000 tons for Europe and 12,000 tons for Africa. Italy continues to negotiate for 10,000 tons. Domestic rail matters are small. Some roads are arranging for supplemental lots of 3,000 to 5,000 tons, each, with mills which now are rolling large tonnages for them.

Some of the railroads are showing a disposition to place orders for cars quietly and have nothing said about them. Several lots of this kind recently placed now have become public, but it is understood there have been other orders closed of which no mention has been made. Car awards of the week include 1,500 gondolas to the Missouri, Kansas & Texas to the American Car & Foundry Co.; 1,000 steel underframes for the Delaware & Hudson to the American Car & Foundry Co.; 1,000 hoppers for the Chesapeake & Ohio to the Pressed Steel Car Co.; 100 hoppers for the Anaconda Copper Co. to the Pressed Steel Car Co.; 550 hoppers and 200 gondolas, for the Lehigh & New England to the Pressed Steel Car Co.; 30 to 50 hopper bodies for the Lake Terminal railway to the Pressed Steel Car Co.; 12 flats for the United States Aluminum Co. to The Standard Steel Car Co. The Chicago & Great Western has dropped its inquiry for 500 cars. New inquiries include 25 ore and 50 hoppers for the Bethlehem Steel Co., making the total asked by this company, 175; 36 tank cars for the Union Tank line and 15 of the same type for the Atlantic Refining Co., 100 mine cars for the Pembina Coal Co. It is reported that the Denver & Rio Grande inquiry for 1,000 box cars has been closed, as well as some cars for the Missouri Pacific railroad.

The Indiana Harbor Belt Railroad Co. has placed 30, the Delaware, Lackawanna & Western Railroad Co. 17 and the New York Central five locomotives, all with the American Locomotive Co.

### More Cars Are Bought

Chicago, Jan. 11.—The American Car & Foundry Co. has taken 1,500 steel underframe box cars for the Missouri, Kansas & Texas railroad and the Pullman Co. has closed for 1,000 of the same kind for the Denver & Rio Grande railroad.

### Spikes Advanced

Pittsburgh, Jan. 11.—Manufacturers of railroad spikes have advanced prices $3 a ton to 2.25c for standard spikes. Smaller sizes are being held at $2 and $3 a ton above that figure. Specifications for spikes are described as heavy, but no new buying is reported.

# Pig Iron Buying

### Includes Round Tonnage by the General Electric Co.

New York, Jan. 11.—Last half buying of pig iron in this and surrounding territory is on an increasing scale and a considerable part of this is being done quietly and without the circulation of general inquiry. Such lots as 5,000 tons, 3,000 tons and miscellaneous requirements, are being closed in this way. Perhaps 3,000 tons of open domestic inquiry is pending in this district, including 1,000 tons for a Hudson river buyer and three 600-ton lots for Brooklyn and New Jersey consumers. Most of the tonnage now being placed for first or last half is on a basis of about $19.75 to $20.25, tidewater. Two Buffalo makers are quoting last half No. 2X at $18, furnace, or $19.84 to $20.10, New Jersey tidewater. Speculative Buffalo iron is available at the same range. Some Pennsylvania furnaces are selling around $20, tidewater, for No. 2X. A Perth Amboy steelmaker closed for about 4,000 tons of basic for second and third quarter, of which 1,000 tons went to two eastern Pennsylvania makers at $19.50, delivered, and the remainder, which was lower in phosphorus, to a Buffalo furnace, at $20, delivered. The General Electric Co., which recently inquired for 6,500 tons of foundry and low phosphorus grades for various plants for second quarter, closed this business and took perhaps 8,000 to 10,000 tons, a large part of which went to Buffalo. New foreign inquiries in the market include two lots of 6,000 tons each of bessemer for France and one of 6,000 tons of the same grade for Italy. Not many new export sales are being made on account of the uncertain freight conditions.

(*For complete prices see page* 162.)

# Scrap Market

**Is Quiet With Tendency Toward Weakness in Some Centers**

Pittsburgh, Jan. 11.—Iron and steel scrap dealers are experiencing rather quiet conditions, but prices have not lost ground. It is reported that one of the more important consumers of heavy melting steel has been figuring in the market this week. Heavy melting stock is held at $18, delivered, although some melters are refusing to pay more than $17.50. Dealers have large stocks of material on hand and more important consumers covered requirements before the end of 1915.

### Dull at Cleveland

Cleveland, Jan. 11.—The scrap market in Cleveland is dull with little buying by the mills. There is some trading among the brokers, but for the most part there is little activity. Heavy melting steel, Cleveland, is quoted at $16.50 to $16.75 gross ton, and this seems to be the general price.

### Shows Weakness

Chicago, Jan. 11.—Iron and steel scrap in this market shows some weakness, although quotations have not reflected the condition yet. Consumers have large tonnages in hand and are not likely to enter the market to buy more for some time. Dealers find embargoes at the larger works prevent shipments and material bought for delivery this month is coming in and must be piled until it can be delivered. These conditions have given food for thought and there is a tendency to expect a slight recession from the high point now registered.

Open weather has favored collection and shipment of scrap from the country and the supply has not been curtailed by the season. Railroads are continuing to offer material. The Belt railroad of Chicago has issued a list containing 2,000 tons; the Michigan Central, 2,000 tons; the Wabash railroad, 2,100 tons; the Kansas City Southern, 900 tons; the Mobile & Ohio, 300 tons; the Chicago & Eastern Illinois, 200 tons; Northern Pacific, 1,300 tons; Union Pacific, 1,000 tons; Southern railroad, 5,000 tons; Great Northern railroad, 1,700 tons.

### Iron Weaker

Cincinnati, Jan. 11.—The scrap market is showing signs of slumping. Prices have not changed, but they are not as strong as they were a week ago. Shipments are falling off slightly, and spot demand, which up until the first of the year was good, is now very low. Heavy melting is quoted at $14.25 to $14.75 per gross ton, but a small tonnage is reported to have been sold last week at $14. Shipments are best on stove plate, heavy melting steel, No. 1 machine cast, bundled sheet scrap and No. 1 busheling.

### Easier Tone at St. Louis

St. Louis, Jan. 11.—The scrap market in this district still is marking time, and while prices have not receded, there is a slightly easier tone owing, perhaps, to the fact that consumers are not anxious about material until after the middle of the month, while dealers, in some cases, have had to move their scrap because of congestion in their yards. Relaying rails, however, are in excellent demand and the supply is rather limited. Railroad offerings before the market are: Southern, 5,280 tons; M., K. & T., 5,250 tons; Wabash, 1,700 tons; Kansas City Southern, 1,060 tons; Chicago & Alton, 500 tons; Mobile & Ohio, 300 tons; Kansas City Terminal Railway Co., 100 tons; N. C. & St. L., 100 tons.

### Advances Extended

Birmingham, Ala., Jan. 11. — While there has been no revision of prices covering old material, dealers are taking a decidedly optimistic view—a position which they have not held for some time past. There has been a slight advance, but not enough to justify revision of list prices. Within the next two or three weeks, it is confidently predicted that the market will advance from $1.50 to $2 per ton—in keeping with the present day pig iron market.

### Activity Renewed

Philadelphia, Jan. 10. — Recent inactivity in the heavy melting steel market in eastern Pennsylvania has been terminated by the appearance of at least two works as buyers with offers of $17, delivered, for tonnage lots. It is doubtful, however, whether much tonnage could be had even at this figure, since sellers are holding off for higher prices. Small lots of heavy steel, usually under some pressure to be sold, have been picked up by the mills at $16.50, delivered. There is a good demand for No. 1 railroad wrought and for heavy cast, but the supply is limited. Several thousand tons of rerolling rails have been sold at $19, delivered eastern Pennsylvania, and carload lots of shafting have brought $23.25, delivered. The freight embargoes against Coatesville works have been raised.

### Strong Demand

New York, Jan. 11.—Strong demand for various grades of cast scrap by foundries in New Jersey and in other nearby territory, continues the principal feature in an old material market that is becoming more active. Heavy cast has been sold at $16.25, delivered at Jersey points, with higher reported, and stove plate and grate bars at $13, delivered. Eastern Pennsylvania steelmakers now are making offers of $17, delivered, for heavy melting steel, but sellers want more money and some of them will not accept business under $18, delivered. Pittsburgh inquiry for steel has subsided.

*(For complete prices see page 162.)*

# Billet Prices

**Still Show Upward Tendency—Reds for Export to England**

Pittsburgh, Jan. 11.—Prices of semi-finished steel products continue their march toward higher levels, but it is difficult to define the position of the market on account of the absence of recent sales. Open hearth billets and sheet bars are held at $35, mill, and bessemer products are named at $34, mill. The cessation of operations at the plants of the Republic Iron & Steel Co. and the Youngstown Sheet & Tube Co., caused by a strike of laborers, temporarily has reduced the supply of billets and sheet bars, although consumers dependent in part upon plants affected by the strike have not been embarrassed, having had sufficient stock on hand to meet requirements. Wire rods, which had been nominally quoted at $40, Pittsburgh, now are listed at $45, Pittsburgh. Leading manufacturers, however, are not offering this material in the open market. Muck bar nominally is quoted at $34, Pittsburgh.

### Rods for Export

Philadelphia, Jan. 10.—Wire rods have been sold for export to England at $55, seaboard, a sale of 600 tons having been made at that figure by a local dealer who recently has disposed of several thousand tons at rising prices for that destination. Very few sales of billets now are being made by eastern mills, as they are sold up tightly to July 1. One of them refused to quote even on 500 tons to a large eastern Pennsylvania buyer the past week. One Pennsylvania mill recently sold to a large buyer about 2,500 tons of forging billets at $55, Pittsburgh. The same mill sold bessemer billets at $33, Pittsburgh, and now asks more. Eastern Pennsylvania makers recently have sold open hearth rolling billets as high as $45, mill.

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Edgar E. Jamison, dealer in alloy and tool steels, has moved his office and warehouse to 154 First street, San Francisco, Cal.

# Structural Steel

**Is in Active Demand for Export to Many Lands**

New York, Jan. 11.—Companies which are maturing building work for the spring, now are making efforts to place their fabricated steel in advance of their plans being prepared, evidently to guard against further price advances. Fabricators are not desirous of booking orders of this kind. Foreign inquiries for structural material are unusually numerous at present and the character of some of these gives the market a distinctly international character. Structural steel interests expect this class of inquiry to continue to expand. Japan has inquired for 18,000 tons of plain material and for several thousand tons of bridges or a total of 20,000 to 25,000 tons. Russia is preparing plans for a large volume of bridge work in connection with new railroad construction and is expected in the market soon. The Dutch East Indian railways, which heretofore have bought in England, are about to place 300 tons of bridge work in this country. Ecuador has been a light buyer. Domestic business in structural lines is looking better constantly and the future is regarded as quite promising. Immediate new work is of fair tonnage. Plain material prices range from 2c, Pittsburgh, or 2.169c, New York, upward, depending upon delivery.

### Shapes Commanding Premiums

Pittsburgh, Jan. 11.—Structural shapes for prompt delivery are commanding 2.25c and above. While the price for contract delivery is 1.85c, that figure, to a considerable extent, is nominal, since manufacturers are not booking additional orders, except for shipment at their convenience. Fabricating shops are operating at maximum theoretical capacity and most of them have enough orders on their books to assure activity for three or four months.

### Cautious as Price Jumps

Philadelphia, Jan. 10.—Moving from one contract price level expiring Jan. 1 to another $7 to $12 a ton higher for first quarter has caused some buyers of structural shapes to specify more cautiously with eastern mills until they have a better view of the future, especially since they ordered in material liberally in December. It is understood a few consumers finished up 1.25c, Pittsburgh contracts, Jan. 1, but the average was several dollars higher. First quarter contracts now run all the way from 1.40c to 2.00c, Pittsburgh, with most of them well above 1.50c, while the late entries have been around the highest price. These prices apply both to eastern Pennsylvania and to western mills selling in eastern territory. Eastern mills are well satisfied to note this easing up of specifications since their order books are very heavy. They are not very desirous of much new business, especially for distant deliveries. An inquiry for 9,000 tons of New York subway work offered this week was declined by some makers.

### Railroad Buying Delayed

Cleveland, Jan. 11.—The market for shapes and plates is very strong in spite of the fact that very few buildings requiring large tonnages are pending. The most important structures in view at present are the terminal for the Cleveland & Youngstown railroad and the hotel to be erected on the site of the Forest City House. The Lake Shore railroad, which contemplated placing orders for from 5,000 to 8,000 tons of structural material for bridges, has delayed action on account of the high price. It is understood that other railroad projects are being held up for the same reason. A builder of dredges has appeared in the market within the past few days with an inquiry for 2,000 tons of shapes and plates for early delivery, and, being unable to obtain quotations from mills, fears that it will be compelled to pay warehouse prices.

### Demand Maintained

Chicago, Jan. 11.—Demand for structural shapes is keeping up well and each week sees a varied assortment of projects closed, even at the high price and deferred delivery now offered. Industrial expansion is giving some tonnage, while railroad and public structures make up most of the remainder. Prices of structurals are strong and nominal quotations are being made by larger producers, new tonnages being accepted only for definite projects.

#### CONTRACTS AWARDED.

Chicago, Burlington & Quincy railroad, bridge material, 2,129 tons: To Chicago Bridge & Iron Co., 1,213 tons; Milwaukee Bridge Co., 594 tons; Wisconsin Bridge Co., 24 tons; King Bridge Co., 80 tons; Morava Construction Co., 114 tons.

Cook county hospital, two pavilions, 1,564 tons, to Morava Construction Co.

National Malleable Castings Co., yard craneway and foundry building, Grant works, Chicago, 1,178 tons, to Morava Construction Co.

Union Iron Works, San Francisco, Foundry building, 800 tons, to Ralston Iron Works.

Union League club addition, Chicago, 475 tons, to American Bridge Co.

Duluth, Missabe & Northern railroad, Lawrence lake viaduct, Bovey, Minn., 469 tons, to American Bridge Co.

City of St. Louis, Mo., first section Children's building, 225 tons, to Keysing Iron & Foundry Co.

County court house, El Paso, Tex., 204 tons.

Elks' Club building, Chicago, Ill., 903 tons, to Hansell-Elcock.

Indiana Steel Co., open hearth building, converter building and mixer building, Gary, Ind., 6,000 tons, to American Bridge Co.

Receivers of the Missouri, Kansas & Texas railroad, various bridges, 1,588 tons to Wisconsin Bridge & Iron Co., Federal Bridge Co., Virginia Bridge & Iron Co.

Receivers of the Missouri, Kansas & Texas Railroad, bridge 499.8 composed of 6-100 feet and 2-98 feet deck girder spans, 513 tons, to American Bridge Co.

Railroad bridge over the Wabash river at Silver Wood, Ind., for the Toledo, St. Louis & Western railroad, 1,300 tons, awarded the American Bridge Co.

Extensions to Wheeling Steel & Iron Co.'s tin plate plant at Yorkville, O., 1,500 tons, awarded the Fort Pitt Bridge Works.

Buildings for hoop and band mill for the Phillips Sheet & Tin Plate Co., Weirton, W. Va., 650 tons, awarded the Penn Bridge Co.

Steel work for the central power and heating plant for the government at Washington, 2,200 tons, to the John Eichley Co., Jr.

Extension to the plant of the Elmira Mfg. Co., Elmira, N. Y., 800 tons, to the McClintic-Marshall Co.

Bridge work for the Cincinnati, Hamilton & Dayton railroad, 400 tons, to the King Bridge Co.

Repair shop for the Southern railway, Knoxville, Tenn., 300 tons, to the Virginia Bridge & Iron Co.

Extensions to the plant of the Samuel L. Moore & Sons Corporation, Elizabeth, N. J., 1,200 tons, to Levering & Gerrigues.

Zobel loft building, Twenty-ninth street and Madison avenue, 1,200 tons, New York City, to Levering & Gerrigues.

Bethlehem Orphan Asylum, Staten Island, N. Y., 200 tons to the Purcell-Knoblach Hardware Co., Brooklyn.

Nurses' Home, German Hospital, New York City, 400 tons, to Levering & Gerrigues.

Buildings for the Anaconda Copper Mining Co., Anaconda, Mont., 2,000 tons, to an independent shop.

Extension of the plant of the Baldwin Locomotive Works, Philadelphia, 1,200 tons, to an independent shop.

Bridge for the Erie railroad over the Susquehanna river, 1,500 tons, to the American Bridge Co.

Bridge for the Lehigh valley railroad at Geneva, N. Y., 175 tons, to the King Bridge Co.

Work for the South American Development Co., in Equador, 150 tons, successful fabricator not announced.

#### CONTRACTS PENDING.

Extension to the Webster avenue line in the Bronx, New York City, 9,000 tons, M. J. Leahy, low bidder.

Extension to the West Farms elevated railroad in the Bronx, New York City, 1,000 tons, L. A. Guidone, low bidder.

Elevated railroad connections at 162nd. street and Eighth avenue, New York City, 1,000 tons, the Battery Construction Co., low bidder.

Bridges for the Dutch East Indian railway, 300 tons, bids being taken.

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The plant of the John M. Melloy Sons, Philadelphia, tinware manufacturers, was damaged severely by fire recently causing a loss to building and stock estimated at about $100,000.

(*For complete prices see page* 162.)

# Wharton Stacks

**Have Been Taken Over—Iron Mines a Valuable Asset**

An option taken several months ago by Miles L. C. Kachelmacher, of Columbus, O., and associates on properties of the Wharton Steel Co., Wharton, N. J., and expiring Jan. 10 has been exercised by the latter and the arrangements of purchase now have been closed. The Wharton properties consist of three blast furnaces of fairly modern type which were erected or rebuilt in 1892, 1901 and 1903 and have been idle for four or five years, a number of inoperative iron mines near Wharton, N. J., coal and stone lands, railroads, etc. It has been repeatedly reported that the iron mines, of which the Hibernia is the most important, have been the most attractive of all the assets to the promoters since these properties are of extensive size and possibilities.

The closing of the Wharton Steel Co. options as yet has had no effect upon the options on the plants of the Thomas Iron Co. and of the Empire Steel & Iron Co., which were taken at about the same time with the original purpose of a general merger. The Thomas option does not expire until Feb. 11 and that on the Empire furnaces and mines at a later date. The only thing that has been learned regarding these options is that the plans for developing the deal are proceeding favorably.

## Improvements in South

Considerable improvement work is under way, and in contemplation, at plants near Birmingham, Ala. The Sloss-Sheffield Steel & Iron Co. is making strenuous efforts to have the city give it permission to relight the old beehive ovens at its Twenty-seventh street furnace, so that another stack can be blown in at that point. There is no available surplus coke in the district. In addition, this company will erect a new stack at Sheffield, as auxiliary to insure the continuous operation of two stacks there—using same stove and blowing power now installed. The Alabama company has optioned additional red ore property near its Gadsden plant; also started to rehabilitate its old Etowah red ore mines, which have been idle for the past four years, preparatory to the blowing in of one or possibly two of the Gadsden furnaces on foundry iron.

**Century of Business.**—The C. C. & E. P. Townsend Co., New Brighton, Pa., announces that the name of the corporation has been changed to the Townsend Co. The company has just completed a century of business as a manufacturer of rivets, nails, wire and wire products. It has the oldest wire mill in America.

# Armor Plate

**Will Be Discussed at Meeting of Senate Naval Committee**

Washington, D. C., Jan. 12. (By wire.)—Resolutions were adopted today by the senate committee on naval affairs providing for a hearing next Tuesday before the committee with regard to the administration bill providing for a government plant for making armor plate and other material. Manufacturers of armor plate will be called before the committee, but the list of those to testify has not been made out.

Senator Tillman, chairman of the committee, said he desires to have armor plate makers come before the committee, so the latter can hear directly the nature of the testimony they will give, saying that makers refused to tell the congressional investigation last year certain facts desired, such as cost of producing armor. Senator Tillman said he thought manufacturers would refuse at the hearing next week to give such evidence. He verified the report that armor plate makers had suggested to him last week that they would make a reduction in armor prices to the government in the event they were given the tonnage covering the proposed five-year naval program.

Admiral Strauss, chief of ordnance bureau, navy department, has submitted to the committee an estimate of the tonnage required, placing it at 113,200 tons. Makers at the hearing last year said a reduction in price could be made if they were given large contracts, thus assuring continuous mill performance.

## Thousands Benefited

New York, Jan. 12. (By wire.)—The Harrisburg Pipe & Pipe Bending Co. has advanced the wages of 2,000 men 10 to 15 per cent. The Pennsylvania and Maryland Steel companies now make formal announcement of a 10 per cent increase, effective Feb. 1.

The combined open feed water heater and hot water meter, known as the Cochrane metering heater, exhibited at the Panama-Pacific Exposition by the Harrison Safety Boiler Works, Seventeenth street and Allegheny avenue, Philadelphia, has received the gold medal award.

# Metal Market

**Registers High Prices, But the Tone is Now Easier**

New York, Jan. 11.—Prices in the metal markets generally have registered high levels during the week but the tone today is slightly easier. Recently considerable added impetus was given to the copper market by the purchase of approximately 60,000 tons of the metal by the British government for future delivery, and prices advanced steadily thereafter. Producers now are asking the following prices on copper for future shipment: Electrolytic, 24c, delivered 30 days; best brands of lake 24c, cash; ordinary and arsenical lake 23.75c, cash. These interests have so little material available for spot shipment that they are asking premiums of ¼ to ¾c per pound on small lots of spot. These prices are being shaded materially, however, by second sellers, who yesterday and today have been offering small lots of spot and nearby at around 23.25c, cash. The weakness is due to a falling off in demand, and to advices from London that the British government now is taking care of the requirements of English munition makers and that it has forbidden general industrial companies to buy in the market more than 50 tons at a time. This action undoubtedly was taken to prevent further price advances and the course of the market in the near future therefore will be watched with much interest.

Following upon the British order in council which restricts exports of tin from Great Britain, the trade here has learned that no further exports of tin will be permitted to be made direct to the United States from the Straits, and the receipt of this news for a time caused an exceedingly tight situation here, since sellers had no desire of getting caught short on their contracts. At the same time, there were no violent upward fluctuations, as the belief here has continued all along that supplies of tin to this country will continue to come forward in ample volume. The volume of business here has been good lately but not active. Prices are as follows: Spot, 41.50c; January, 41.25c; February, 41c; March, 40.75c. The volume of business today was of rather small proportions.

The price of lead was advanced last Friday by the American Smelting & Refining Co. to 5.90c, New York, and 5.82½c, St. Louis. This price is being shaded in the outside market, which is quoted at 5.85c to 5.90c, New York, and 5.77½c to 5.82½c, St. Louis.

Antimony for spot delivery continues scarce and some high prices were paid during the week, the market going up to 43c, duty paid. The scarcity was partially relieved by arrivals and prices now are lower. Spot Chinese and Japanese are quoted at 41.50c, duty paid; domestic antimony is quoted at 41c to 41.50c.

The spelter market has continued exceedingly quiet but firm. Prime western is quoted as follows: Spot, 17c to 17.25c, St. Louis; January, 16.75c to 17.25c; February, 16c to 16.50c; March, 15.50c to 15.75c and second quarter, 13.75c. Brass special for prompt shipment is quoted nominal, at 19c to 20c.

The outside market on aluminum is easier at 54c to 56c, on No. 1 ingot in carload lots. Demand is quiet.

The third annual meeting of the Harmony club, of the J. M. & L. A. Osborn Co., Cleveland, was held Jan. 4, 5 and 6. Some sessions were devoted to discussion of business topics. There were also social features, including the annual banquet at the Athletic club.

# Rule of Rioters is Ended by Militia

## One Night of Violence Causes Three Deaths and Heavy Loss of Property—Operations at Republic and Sheet & Tube Plants Resumed

THE strike situation at Youngstown cleared rapidly during the early part of this week. Owing to the presence of the militia, the firmness of some of the public officials and the fairness of the companies, serious trouble ended almost as quickly as it started. About 2,500 of the 11,000 employes of the Youngstown Sheet & Tube Co. returned to work Monday, and at a meeting Tuesday night 300 striking employes voted to return to work Wednesday morning. At that time, the plant resumed almost in full. The Lansingville plant of the Republic Iron & Steel Co. also resumed Wednesday and it is expected that the Youngstown plant will be in full operation in a day or two. All employes of the Republic and the Sheet & Tube plant will receive an increase of 10 per cent in wages. Some of the Ohio national guard have already been ordered home, but the eighth regiment will probably be held a few days longer to prevent recurrence of trouble.

Following the serious disturbances, saloons at East Youngstown, Girard and Niles were closed. When the saloons were allowed to open Tuesday with the understanding that they were to sell by the drink only and not in bottles or larger quantities, it was found that the terms of the opening were being violated at Girard and Niles. Laborers were swarming to those towns in large numbers and the saloonkeepers were ordered to stop selling in quantities or to close their doors.

Grand jury investigation is in progress and federal officials are also inquiring as to the truth of rumors that the strike was instigated by representatives of foreign governments. Many rioters have been fined from $5 to $50 and some have received jail sentences at the hands of Mayor Cunningham, of East Youngstown. Other trials are to be held. Federal postoffice inspectors have made several arrests in connection with the looting and burning of the East Youngstown post office. The work of clearing the ruins in East Youngstown is progressing rapidly with the aid of dynamite. Walls which threaten to fall are being removed.

Several hundred day laborers employed at coke works of the Carnegie Steel Co., at Sharon, went out on a strike Monday, but are returning to work. Aside from the little trouble at Sharon, labor disturbance has not shown any tendency to extend beyond the immediate Youngstown district.

Crazed by drink following the celebration of holidays of the Greek church, mobs of foreign laborers raged through the little manufacturing town of East Youngstown, O., adjoining the city of Youngstown, Friday night, Jan. 7, destroying life and property with frightful recklessness. The principal results of the rioting were:

Three men killed, one who was engaged in looting, one mill employe and one railroad brakeman.

Over 100 persons, including women, wounded, many of whom were taken to Youngstown hospitals.

About 70 buildings, including homes, destroyed by fire.

Property damage in village estimated at from $500,000 to $800,000. Property loss to companies small.

Mills of the Republic Iron & Steel Co. and the Youngstown Sheet & Tube Co. were closed. Blast furnaces were banked.

The blast furnace of the Struthers Furnace Co., although not involved in the strike, banked from Friday until Wednesday.

All the trouble arose on account of the demand for an increase in wages of common laborers from 19½ cents an hour to 25 cents an hour, made first by laborers of the Republic Iron & Steel Co. and afterward by laborers of the Youngstown Sheet & Tube Co. The Republic company officials offered the strikers 22½ cents an hour and the Youngstown Sheet & Tube Co. gave notice of an advance of 10 per cent, but frenzied men were not in any mood to consider concessions and started on their work of destruction. There was no violence of importance at the Republic plant.

### Fight at Bridge

The first serious conflict came when mill guards refused to allow the drunken mob to cross the foot bridge into the works of the Sheet & Tube company. Some shots were fired by the guards, but it does not appear that any of the members of the mob were shot at that time. Maddened by their failure to cross the bridge, the mob began to loot stores, set fire to buildings and bring on such a night of terror as had never been seen even in the busy manufacturing section.

Governor F. B. Willis, upon receiving word Friday of the serious condition at East Youngstown, ordered the Fifth regiment, Cleveland, the Eighth regiment, Bucyrus, and the Fourth regiment, Columbus, in all about 2,100 men, with two machine gun batteries and hospital corps, to proceed to East Youngstown. The command was quickly obeyed under the direction of Brig. Gen. J. C. Speaks, and the militia began arriving at Youngstown before daylight Saturday morning. The arrival of the soldiers had a quieting effect. There was very little trouble Saturday. Sunday was a quiet day, but the soldiers remained on guard.

When rioting was started late Friday afternoon across the river, Mayor A. B. Stough, of the town of Struthers, who is chief clerk in the office of the Struthers Furnace Co., assembled Struthers citizens, armed them with guns and revolvers and prevented what promised to be serious destruction of property. The river bridge near the works, it was discovered, had been mined with dynamite and the town had been menaced from the rear, where vandals had threatened to reach with high explosives the immense impounding dam of the Mahoning Water Co. and cause an awful flood.

The city solicitor of the village, Oscar Diser, a former member of the Ohio legislature, a man of moral and physical courage, was the hero of Friday night's rioting. Getting together a few determined men, he entered a hardware store, armed them with guns and revolvers and drove the cowardly mobs from the streets. This citizens' posse even followed the wilder members of the gang into their homes, arrested them and landed them in the county jail.

## Chicago Plant Closed

Chicago, Jan. 10.—Following a strike of about 400 of the 600 employes of the Edward Valve Mfg. Co., East Chicago, the plant has been closed and will not resume operations until next week at the earliest. Necessary repairs will be made in the meantime. Sufficient stock has been finished to

care for contract shipments for some time.

The plant is engaged in making parts for shrapnel shells and President Olaf Oleson has asked the aid of the government to determine whether a plot to interfere with his company has been fomented. Hinton G. Clabaugh, head of the bureau of investigation of the department of justice, has been called into consultation and will investigate the circumstances of the strike.

## Confused

**Are Market Conditions as Result of the Strikes**

Youngstown, O., Jan. 11.—With two of the leading independent companies in this district practically at a standstill, iron and steel market conditions naturally appear confused. Manufacturers not affected by the labor trouble say the inquiry for their products this week has been lighter in volume than for some time. This is true both of pig iron and steel sheets. The steel plant of the Republic Iron & Steel Co. has been closed only about a week, and that of the Youngstown Sheet & Tube an even shorter time. Their inability to make deliveries of semi-finished material has not hampered consumers of sheet bars in this district. Such consumers have enough material apparently to tide them over a temporary gap in deliveries, although indefinite continuance of the difficulty might affect operations of some sheet mills, as little material is available in the open market anywhere. The present loss in production will be an added strain on the already taut semi-finished market. Even before the strike some consumers were remarking upon delayed deliveries and it is possible that present conditions will be a factor in even higher prices for steel sooner than had been expected. No producer of billets and sheet bars even hazarded a guess at current quotations for this material today, but one consumer stated he was quoted $37.50, Youngstown, for open hearth sheet bars, recently, and another said he believed the bessemer sheet bar market was about $34, and the open hearth steel market about $37, Youngstown.

## Advances in East

Philadelphia, Jan. 11.—Many eastern iron and steel works will follow the lead of the United States Steel Corporation and large independent companies in advancing the wages of unskilled labor. This will be worked out by various companies along different lines, in accordance with the present scale and with local conditions. Pay of unskilled labor in the east shows considerable dissimilarity among the plants and at present ranges from 15½ to 17½ cents per hour. In most instances and especially where the rate is lowest, a 10 per cent advance will be granted. The Cambria Steel Co. has posted such an increase to supply to all classes of unskilled labor affecting approximately 9,000 men. The Pennsylvania and Maryland Steel companies are expected to make a similar advance Feb. 1. Some of the eastern steel companies had preceded the Steel Corporation in advancing labor. The Reading Iron Co. announced a new schedule 5 to 10 per cent higher around the first of the year, while the Bethlehem Steel Co., several months ago, posted a general advance. Last October, the Empire Steel & Iron Co., the Thomas Iron Co. and other Lehigh valley furnace companies advanced labor to 17½ cents per hour and this rate now is in general effect in that district.

## Pittsburgh Advances

Pittsburgh, Jan. 11.—Independent manufacturers in the Greater Pittsburgh district continue to post notices of increases in wages similar to those offered by the United States Steel Corporation, as outlined by Judge Elbert H. Gary last week.

La Belle Iron Works, Steubenville, O., has notified its employes that it will pay the standard wage scale. This announcement was made by R. C. Kirk, president of the company. The American Manganese Mfg. Co., Dunbar, Pa., and the Semet-Solvay Co., which operates a plant at the same place, have notified their employes of an increase in wages.

Blast furnace managers in the Mahoning and Shenango valleys and in Pittsburgh have announced that they will pay the prevailing wage scales as soon as standards are established.

## Will Raise Wages

Chicago, Jan. 10. — Wages of employes of the Colorado Fuel & Iron Co. are to be raised to the level paid by the United States Steel Corporation, including the recent 10 per cent advance, according to announcement of President Welborn of the former company.

Wisconsin Iron & Wire Works, 186 East Water street, Milwaukee, has increased its capital stock from $30,000 to $80,000, on account of increase in business.

## Near Highest

**Is Unfilled Tonnage of United States Steel Corporation**

An accumulation of unfilled orders, which is within a comparatively small margin of the highest mark shown since the issuance of monthly statements of tonnage on hand, now is on the books of the United States Steel Corporation. On Dec. 31, 1915, the total business awaiting shipment was 7,803,220 tons, an increase of 616,731 tons over Nov. 30. The highest point ever reached by the unfilled orders at the end of any month was on Dec. 31, 1912, when 7,932,164 tons were shown, or only 125,946 tons in excess of the present total. It is expected that the bookings at the end of January will establish a new high point.

The unfilled orders of the Steel Corporation at the close of each month since the monthly announcements were inaugurated, showing the changes in tonnage and percents, are as follows:

| Date. | Total. | Change, tonnage. | Change, per cent. |
|---|---|---|---|
| Dec. 31, 1915.... | 7,803,220 | 616,731+ | 8.58+ |
| Nov. 30, 1915.... | 7,189,489 | 1,024,037+ | 16.63+ |
| Oct. 31, 1915.... | 6,165,453 | 847,834 | 14.06+ |
| Sept. 30, 1915.... | 5,317,618 | 409,163+ | 8.13+ |
| Aug. 31, 1915.... | 4,908,455 | 20,085— | 0.04— |
| July 31, 1915.... | 4,928,640 | 250,344+ | 5.35+ |
| June 30, 1915.... | 4,678,196 | 413,598+ | 9.69+ |
| May 31, 1915.... | 4,264,598 | 102,354+ | 2.46+ |
| Apr. 30, 1915.... | 4,162,244 | 93,505— | 2.21— |
| Mar. 31, 1915.... | 4,255,749 | 89,622— | 2.06— |
| Feb. 28, 1915.... | 4,345,371 | 96,800+ | 2.28+ |
| Jan. 31, 1915.... | 4,248,571 | 411,928+ | 10.74+ |
| Dec. 31, 1914.... | 3,836,643 | 512,051+ | 15.40+ |
| Nov. 30, 1914.... | 3,324,592 | 136,505— | 3.94— |
| Oct. 31, 1914.... | 3,461,097 | 326,570— | 8.62— |
| Sep. 30, 1914.... | 3,787,667 | 425,664— | 10.01— |
| Aug. 31, 1914.... | 4,213,331 | 54,742+ | 1.32+ |
| July 31, 1914.... | 4,158,589 | 125,732 | 3.12+ |
| June 30, 1914.... | 4,032,857 | 34,697+ | 0.86+ |
| May 31, 1914.... | 3,998,160 | 278,908— | 6.98— |
| Apr. 30, 1914.... | 4,277,068 | 376,757— | 8.09— |
| Mar. 31, 1914.... | 4,653,825 | 372,615— | 7.42— |
| Feb. 28, 1914.... | 5,026,440 | 412,760+ | 8.95+ |
| Jan. 31, 1914.... | 4,613,680 | 331,572+ | 7.74+ |
| Dec. 31, 1913.... | 4,282,108 | 114,239— | 2.59— |
| Nov. 30, 1913.... | 4,396,347 | 117,420— | 2.60— |
| Oct. 31, 1913.... | 4,513,767 | 490,018— | 9.79— |
| Sep. 30, 1913.... | 5,003,785 | 219,683— | 4.24— |
| Aug. 31, 1913.... | 5,223,468 | 175,888— | 3.03— |
| July 31, 1913.... | 5,399,356 | 407,965— | 7.03— |
| June 30, 1913.... | 5,807,317 | 517,005— | 8.18— |
| May 31, 1913.... | 6,324,322 | 654,440— | 9.38— |
| Apr. 30, 1913.... | 6,978,762 | 490,194— | 6.55— |
| Mar. 31, 1913.... | 7,468,956 | 187,758— | 2.45— |
| Feb. 28, 1913.... | 7,656,714 | 170,654— | 2.18— |
| Jan. 31, 1913.... | 7,827,368 | 104,796— | 1.32— |
| Dec. 31, 1912.... | 7,932,164 | 79,281+ | 1.01+ |
| Nov. 30, 1912.... | 7,852,883 | 258,502+ | 3.40+ |
| Oct. 31, 1912.... | 7,594,381 | 1,042,874+ | 15.33+ |
| Sep. 30, 1912.... | 6,551,507 | 388,132+ | 6.29+ |
| Aug. 31, 1912.... | 6,163,375 | 206,296+ | 3.46+ |
| July 31, 1912.... | 5,957,079 | 149,773+ | 2.58+ |
| June 30, 1912.... | 5,807,346 | 56,363+ | 0.98+ |
| May 31, 1912.... | 5,750,983 | 86,983+ | 1.52+ |
| Apr. 30, 1912.... | 5,664,885 | 360,044+ | 6.97+ |
| Mar. 31, 1912.... | 5,304,841 | 149,359— | 2.79— |
| Feb. 29, 1912.... | 5,454,200 | 74,479+ | 1.38+ |
| Jan. 31, 1912.... | 5,379,721 | 294,960+ | 5.71+ |
| Dec. 31, 1911.... | 5,084,761 | 942,806+ | 23.24+ |
| Nov. 30, 1911.... | 4,141,955 | 447,627+ | 12.06+ |
| Oct. 31, 1911.... | 3,694,328 | 83,011+ | 2.25+ |
| Sep. 30, 1911.... | 3,611,317 | 84,668— | 2.34— |
| Aug. 31, 1911.... | 3,695,985 | 111,900+ | 3.33+ |
| July 31, 1911.... | 3,584,085 | 223,027+ | 7.16+ |
| June 30, 1911.... | 3,361,058 | 247,871+ | 7.96+ |
| May 31, 1911.... | 3,113,187 | 105,617— | 3.28— |
| Apr. 30, 1911.... | 3,218,704 | 228,597— | 6.63— |
| Mar. 31, 1911.... | 3,447,301 | 46,758+ | 1.37+ |
| Feb. 28, 1911.... | 3,400,543 | 289,624+ | 9.31+ |
| Jan. 31, 1911.... | 3,110,919 | 436,163+ | 16.30+ |
| Dec. 31, 1910.... | 2,674,757 | 85,656— | 3.09— |
| Nov. 30, 1910.... | 2,760,413 | 111,536— | 3.88— |
| Oct. 31, 1910.... | 2,871,949 | 286,157— | 9.12— |
| Sep. 30, 1910.... | 3,159,106 | 379,088— | 10.74— |
| Aug. 31, 1910.... | 3,537,128 | 433,803— | 10.92— |
| July 31, 1910.... | 3,910,931 | 286,863— | 6.72— |

## Obituaries

William A. Comstock, president of the Cleveland Wire Spring Co., Cleveland, succumbed on Sunday, Jan. 9, to injuries received when he was struck by an automobile 35 hours previously. He was more than 70 years of age, but had continued in the active direction of the affairs of the company. He had returned to Cleveland only two days previously from a trip to California, and was leaving the office at the close of the day's work when injured.

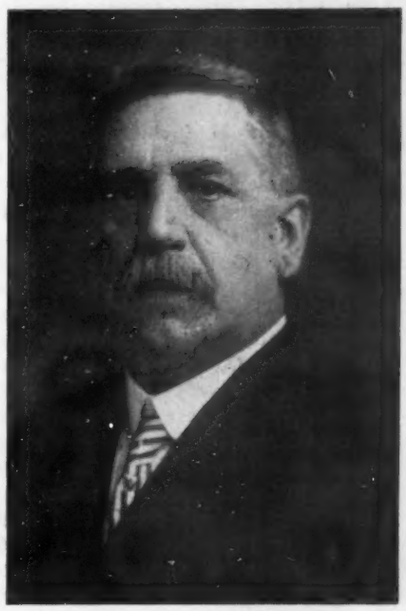
Mr. Comstock was born in Providence, R. I., on June 21, 1845. He entered business in New York, shortly after graduating from the Providence schools, and later joined the Chicago office of the Cleveland Rolling Mill Co. He maintained his connection with this company at Chicago for a number of years. In 1893, he became associated with the Cleveland Wire Spring Co. and on July 17, 1893, was elected secretary. He held this office, jointly with that of treasurer, until June 30, 1914, when he was elected president to succeed the late R. C. Moody. The company's business expanded greatly during his connection with it, and for this growth his associates largely give credit to Mr. Comstock's executive ability and business capacity. The business of manufacturing upholstering springs, to which the company's energies were confined in 1893, has been broadened to include the making of all types of springs and sheet metal goods. He is survived by one son, W. W. Comstock, Los Angeles, Calif.

Horace G. Boughton, for many years prominent in the development of sand preparing and conveying machinery, died at his home in Cleveland, Jan. 7, at the age of 67 years. He had been president of the Standard Sand & Machine Co., Cleveland, ever since its organization 16 years ago. The company was incorporated in 1900 to manufacture a core sand mixer, which Mr. Boughton had designed, and which was the first machine of this type ever built.

Mr. Boughton's association with the foundry industry began 36 years ago. He was born in Akron, O., Nov. 22, 1848, and after graduating from the public schools of that city, became a salesman. Later he began the manufacture of bed springs at Wooster, O., and subsequently took up the making of agricultural implements. In 1880, he opened a sand pit at Portage, O., for furnishing molding sand. This branch of the business has been maintained, the Portage pits being abandoned for several deposits in the upper Cuyahoga valley. His close association with the foundry and sand industries convinced him of the need of mechaniacl appliances for preparing molding sand and led to the development of the first mixer in 1900. Since that time, the business has grown to include a complete line of sand preparing and conveying equipment.

Death followed only a few days' illness from pneumonia, although Mr. Boughton had been in poor health for several years. He is survived by a widow and two sons, John A. and Harry E., vice president and treasurer, respectively, of the Standard Sand & Machine Co.

William F. Bonnell, who had had important association with the sales departments of various steel companies, died at his apartments in the Hotel



WILLIAM A. COMSTOCK

Breslin, New York City, Jan. 8, after a few days illness with pneumonia, aged 54 years. Mr. Bonnell most recently had been connected with the Algoma Steel Corporation, Sault Ste. Marie, Ont., as general sales agent and during the past two years he had sold for his company a large tonnage of steel rails to several railroads in this country. At the time of his death he was interested largely in the making of munition contracts with the allies. Mr. Bonnell was an Englishman, having been born at Bradford, Yorkshire. He came to this country in 1880 and entered the steel business at Chicago. He remained there until 1882, when he located at Youngstown. He was identified with the Mahoning Valley Iron Co. and later managed a co-operative rolling mill at Hubbard, O. In 1899, he became district sales agent for the Republic Iron & Steel Co. at Cleveland. Several years later he became a member of the steel firm of Otis, Bonnell & Co., which was sales agent for the Jones & Laughlin Steel Co. This firm was dissolved six years ago.

O. C. Gayley, 56 years old, first vice president of the Pressed Steel Car Co., Pittsburgh, and vice president of the Western Steel Car & Foundry Co., Chicago, died at his home in New York City, Jan. 9. He began his career as a member of the engineering corps of the Pennsylvania railroad and later was division engineer of the Philadelphia & Reading railroad. Subsequently, he became an operating official of the St. Louis Car Wheel Co. Before joining the Pressed Steel Car Co., Mr. Gayley was general manager of the Safety Lighting & Heating Co., of which he was a director at the time of his death. One of Mr. Gayley's brothers, James Gayley, was a former vice president of the United States Steel Corporation, and is now president of the American Ore Reclamation Co. and of the Sheffield Coal & Iron Co.

A. W. Sprague, for many years the sales manager of the woven wire fence department of the American Steel & Wire Co., died at his home in La Grange, Ill., Dec. 29. Mr. Sprague was born in Wesbech, England, March 16, 1856. When but eight years of age, with his parents and sister, he came to the United States. They located at Aurora, Ill., where within a year both parents died of typhoid fever. In his young manhood, he went to DeKalb, entering the employ of the Ellwood Fence Co., the founder of the barb-wire industry and the forerunner of the American Steel & Wire Co. From that day on his business career was identified with these companies with which his ability and leadership soon brought deserved recognition and he steadily advanced until he had a place in business affairs. He was also very active in civic, religious and educational circles.

Nathan Ely Platt died Jan. 6 at the Chicago Beach hotel, Chicago, where he had lived since the hotel was opened in 1893. He was born in Washington, Conn., in 1823, and went to Chicago in 1861, organizing the firm of Platt & Thorn, iron and steel dealers. One of his early enterprises was in connection with the construction of the Sault Ste. Marie canal, in which he was associated with John Z. White.

Arthur Gale Johnson, general manager of Isaac G. Johnson & Co., Spuyten Duyvil, N. Y., manufacturers of steel castings, died at his home in Spuyten Duyvil on Jan. 7, aged 54 years. He was educated in the Co-

lumbia School of Mines and for many years was occupied with business in the west. Some years ago he returned to the east to become general manager of Isaac G. Johnson & Co.

Joseph Bialosky, pioneer Cleveland scrap dealer, died Saturday, aged 64. Mr. Bialosky founded the Cleveland Iron & Metal Co. 41 years ago, 20 years later establishing Bialosky Bros., in which he was actively associated with his sons until the time of his death. He was well known in iron and steel circles in Cleveland, Pittsburgh and the valleys.

Charles L. Jones, Milwaukee, vice president of the Falk Co., was killed Jan. 6, when his automobile ran off a bridge above the Chicago & Northwestern railroad tracks and dropped about 40 feet. He was accompanied by his son, Cary, aged 15 years, who was also killed.

John T. Langan, Trenton, N. J., general manager of the J. L. Mott Co., died Jan. 3. He had been ill but two weeks. Mr. Langan was a native of New York City and had been connected with the company for the past 27 years.

Thomas Wallace, a pioneer in the manufacture of copper wire, died Jan. 1 at his home in New York City, aged 88 years. For the past 15 years he had been managing director of the W. A. Clark Wire Co., of New York City.

Charles C. Scaife, aged 71, president of William B. Scaife & Sons Co., Pittsburgh, died recently at his home in that city. He was a well known member of the iron trade in western Pennsylvania.

Wallace Scott, aged 65 years, president of the Remington & Sherman Co., Philadelphia, manufacturer of safes, committed suicide Dec. 26 at his home in Philadelphia by taking poison. His act was due to ill health.

John L. Ketcham, 71 years old, former secretary and treasurer of the Bown-Ketcham Iron Works, Indianapolis, died at his home last week.

Graham Fraser, of New Glasgow, N. S., one of the pioneers of the Nova Scotia steel industry, died Christmas Day at the age of 68 years.

A. Ferdinand Ehrenzeller, well known in the ferro-alloy trade, died suddenly at his home in Philadelphia, Jan. 1, aged about 50 years.

James Alexander, president of Alexander & Cox Co., builder of gasoline engines, Chicago, died Dec. 28, aged 44 years. Burial was at Exeter, Neb.

Charles C. Schneider, regarded as the dean of railroad engineering in this country, past president of the American Society of Civil Engineers, and one of the leading bridge experts of the continent, died at his home in a Philadelphia suburb on Jan. 8, aged 72 years. At the time of his death, he was consulting engineer of the American Bridge Co., for the Quebec bridge and for the Canadian Pacific railroad. For years, he was chief engineer of the Pencoyd Iron Works, Philadelphia, and when that plant was absorbed by the American Bridge Co., he became vice president and chief engineer of the latter company.

## May Meeting

**Of Institute to be Held in New York—Dues Are Increased**

Friday and Saturday, May 26 and 27, have been selected by the directors as the tentative dates for the annual meeting of the American Iron and Steel Institute, to be held at New York City. The committee on arrangements which has been appointed to take care of this meeting, consists of the following: James A. Farrell, chairman; E. A. S. Clarke, John C. Maben, Chas. M. Schwab, John A. Topping, Frank S. Witherbee and Jas. A. Burden.

At the meeting of the directors at New York City on Jan. 6, it was decided not to increase the number of members in either the associate or active classes. At the present time, the active membership list of 1,250 is full and of the associate membership of 250 only eight vacancies remain. When these lists are filled, no more members will be elected except to fill vacancies. The board decided to increase the admission fees from $5 to $20 and the annual dues from $10 to $20, effective May 1, 1916, the beginning of the new institute year. The following new members were elected to the associate list:

Dulin A. Barrett, district manager, American Sheet & Tin Plate Co., Vandergrift, Pa.

Thomas Cantley, president and general manager, Nova Scotia Steel & Coal Co., Ltd., New Glasgow, N. S.

Clarence R. Marchant, Manufacturers' Record, Baltimore.

William L. Niekamp, president, Beck & Corbitt Iron Co., St. Louis.

John Ruddiman, vice president and sales manager, Issley Doubleday Co., New York.

Bertram S. Stephenson, resident agent, M. A. Hanna & Co., Pittsburgh.

W. P. Burden, Burden Iron Co., Troy, N. Y.

Daniel W. Tallcott, manager, Burden Iron Co., Troy, N. Y.

**An Attractive Calendar.** — The Youngstown Sheet & Tube Co., Youngstown, has issued an unusually attractive calendar for 1916. The illustrations convey an excellent idea of some of the principal processes through which the raw materials pass from the ore to the finished product. Statistics are also given, showing the consumption and production of leading products by the Youngstown company. The company will be glad to send a calendar to all applicants who forward seven cents in stamps to cover the cost of mailing.

## Buffalo Shades on Pig Iron

New York, Jan. 12. (By wire.)—A Poughkeepsie buyer has closed for 2,500 tons of No. 1X and No. 2 plain for last half from Buffalo and western furnaces. Buffalo No. 2 plain went under $18 to a Bridgeport steel maker who is understood to have bought about 5,000 tons for third quarter on a basis ranging from $19.50 to $20, delivered.

## Will Lift Embargoes

Pittsburgh, Jan. 12 (By wire.) — Railroad embargoes against the shipment of coke to the plant of the Youngstown Sheet & Tube Co., Youngstown, probably will be lifted tomorrow or Friday. They were declared last Saturday as a result of the strike which closed down the entire plant for several days. The spot market, despite the sharp declines in price, is quiet. Coke makers now are shipping fuel to eastern consumers, although deliveries are uncertain.

## Wm. Tod Co. Changes

Youngstown, O., Jan. 11. — Important changes have been announced by David Tod, president of the William Tod Co. L. A. Woodard, general manager, retires to the duties of vice president and director, and S. Sherley French, assistant general manager, succeeds him taking full charge of the plant operations. R. D. Day, who has been connected with the sales department, becomes general sales manager. These changes are effective at once. About four years ago L. A. Woodard succeeded I. H. Reynolds as vice president and general manager of the Tod works, being promoted from works manager. Mr. French was for some years chief clerk at the plant of the Brier Hill Steel company, and went to the Wm. Tod works about four months ago, as assistant to the general manager.

At the annual meeting of the Cincinnati Sheet Metal Contractors Association held recently, the following officers were elected: President, F. L. Stechow; vice president, John Weigel; secretary, John A. Hegeler; and treasurer, Chas. Kobmann. The annual banquet of the association will be held Feb. 1.

# Making By-Product Coke for the Market

THE manufacture of by-product coke as an independent commercial enterprise has been a comparatively recent development, most by-product ovens having been built in connection with either gas works or blast furnaces. An interesting example of a commercial by-product coke plant is that of the Kentucky Solvay Coke Co., Ashland, Ky. This plant was built by the Semet-Solvay Co., Syracuse, N. Y. Markets for its product are afforded locally. The situation was chosen because of the natural advantages of a position between the coking coal fields and the consumers, coal being readily accessible from the Pittsburgh, Kanawha, Logan and Eastern Kentucky bituminous districts, as well as from the Pocahontas and New River smokeless coal fields. Shipping facilities to the north and west are afforded by rail, and south by rail and river.

The plant, when completed, will consist of 216 ovens, with a capacity of 4,000 tons of coal per day. The construction of the first unit of 54 ovens was begun in May, 1912, and was completed in July, 1913. This unit has a capacity of 1,000 tons of coal, or 750 tons of coke per day. The second unit of 54 ovens, which will be a duplicate of the first, is now nearly completed. The layout of the plant is shown in Fig. 2. The principal products of the plant are blast furnace, foundry and domestic coke. The by-products are coal tar, crude benzol and ammonium sulphate, the latter being the most important of the three. The gas is not utilized at present, except for the needs of the plant.

The company's ovens are of the Semet-Solvay, series flue, individual regenerator type. Each oven is 36 feet long, 12 feet high and 21 inches wide, with a 2-inch taper, and is equipped with a pair of regenerators. The average single charge is 16 tons of coal. A cross sectional view of one of these ovens is shown in Fig. 7.

The coal is received at the plant from the mines by rail in hopper bottom cars. It is unloaded through track hoppers fitted with reciprocating feeders, which deliver the coal to a steel pan conveyor. This elevates and delivers the coal to a crusher located nearby under the mixing bins. The plant is arranged to use a mixture of coals, if desired, to improve the quality of the coke, but for most of the product only one coal is used. From the crusher the coal is carried to the mixing bins by elevators and conveyors. From the mixing bins it is delivered by measuring machines to Williams pulverizers, in the proper proportion to make the grade of coke desired. From these it goes by elevators and conveyors to the main or charging bins at the ovens. Here it is delivered to an electrically driven car containing a full charge for one oven; this car runs on a track laid over the tops of the ovens. Before the coal goes into the oven, each car with its load is weighed on a track scale located between the bins and the charging floor of the ovens. Each oven is filled through four holes.

The coal remains in the oven 17 or 18 hours, the variation in time being due to the kind of coal used and the quality of coke desired. After coking, the charge is removed from the oven by a Wellman - Seaver - Morgan pusher, which runs on a double track on the ground alongside the ovens. The charge of coke is received on the discharge side of the ovens in a Semet-Solvay quenching car, illustrated in Fig. 3. It is quenched by means of water forced through nozzles, which extend out from the oven block over the car at regular intervals. If the coke is of blast furnace grade, it is delivered to a 72-inch Link Belt

FIG., 1—COOLING CONVEYOR FOR COKE

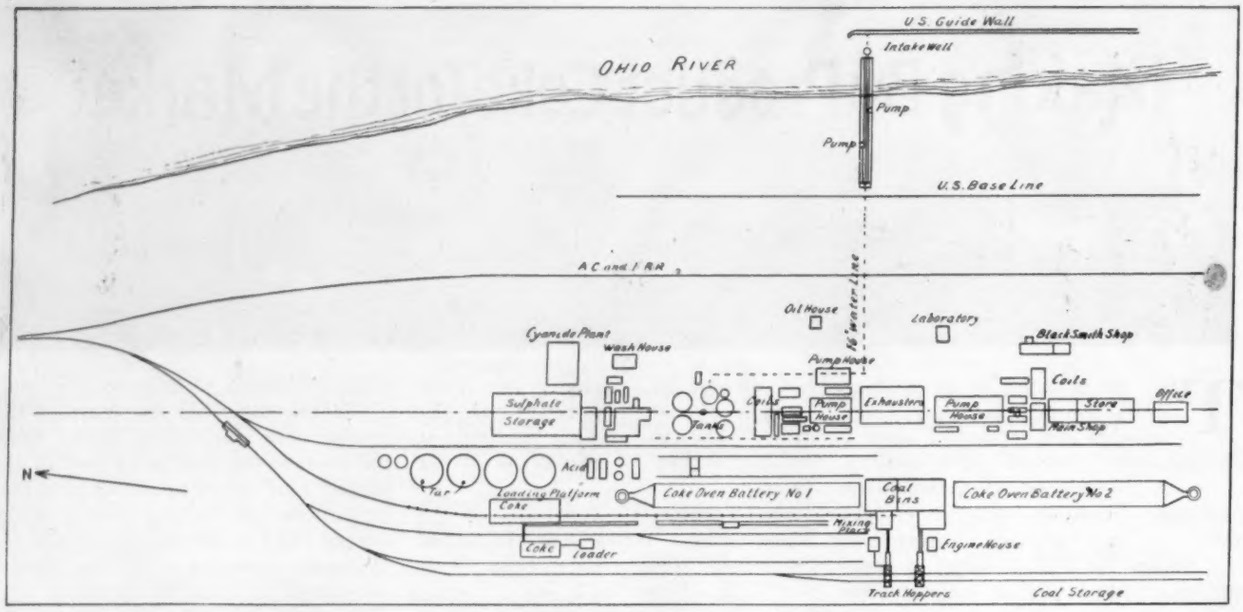



FIG. 2—GENERAL LAYOUT OF KENTUCKY SOLVAY COKE CO.'S PLANT, ASHLAND, KY.

steel plate cooling conveyor, shown in Fig. 1, which conveys and elevates it to a loading station, where it is screened and loaded into cars for shipment.

The small coke from the screens is carried to a coke crusher. After being crushed it is elevated and screened into the proper sizes for shipment as domestic coke. The foundry coke is delivered from the quenching car to a brick-covered cooling wharf, upon which it is hand-picked and loaded for shipment to foundries. The pickings and small coke are sent through a crusher to the domestic coke department, where they join the screenings from the furnace coke.

The gases produced from the dry distillation of the coal leave the ovens through uptake pipes near one end, and are collected in hydraulic mains, from which they enter a series of Doherty washer coolers, shown in Fig. 7. They are then passed through exhausters, and in turn through a series of tower scrubbers in which the ammonia, tar and light oil or crude benzol oil are removed. A portion of the gases are then returned to heat the ovens and are used for other purposes around the plant. In the Doherty washer-coolers and ammonia scrubbers, the ammonia is removed in the form of a weak ammoniacal liquor, together with tar. These are separated by the usual decantation process. The ammoniacal liquors are then sent to the by-product recovery plant for distillation and the recovery of ammonium-sulphate. In this operation the indirect process is used. After passing through the benzol scrubbers, a portion of the gases are returned to the ovens by means of a suitable system of piping, and are burned in the combustion flues, to heat the ovens. The quantity of gas so used is controlled by automatic pressure regulators on the gas mains. The gas is measured through fixed orifices within the burners, the combination being such as to discourage hasty adjustment by the workmen. Regulation of the flow of gas to the individual oven flues is under the control of an expert.

In the flues the gas meets the necessary amount of air for combustion, which is delivered from the regenerators alternately to the opposite ends of the series of flues in each oven. This series flue arrangement enables

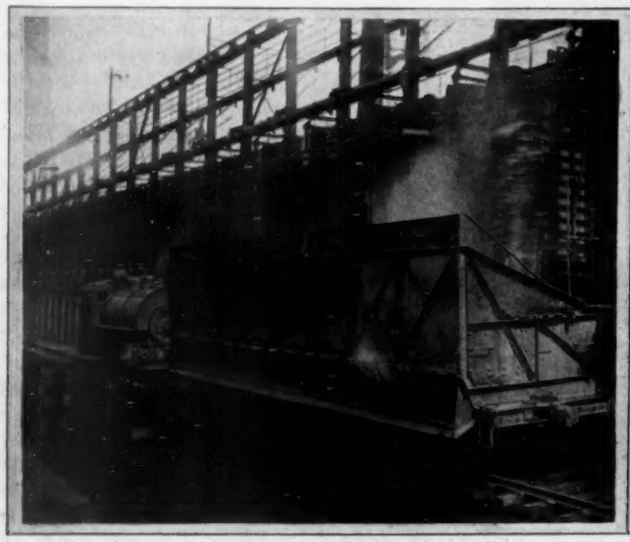


FIG. 3—DISCHARGE SIDE OF OVEN SHOWING CHARGE BEING RECEIVED IN QUENCHING CAR

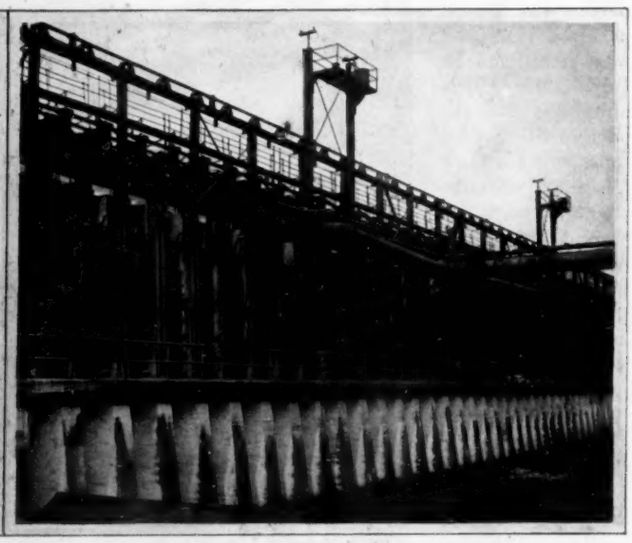


FIG. 4—PUSHER SIDE OF SOLVAY COKE OVENS

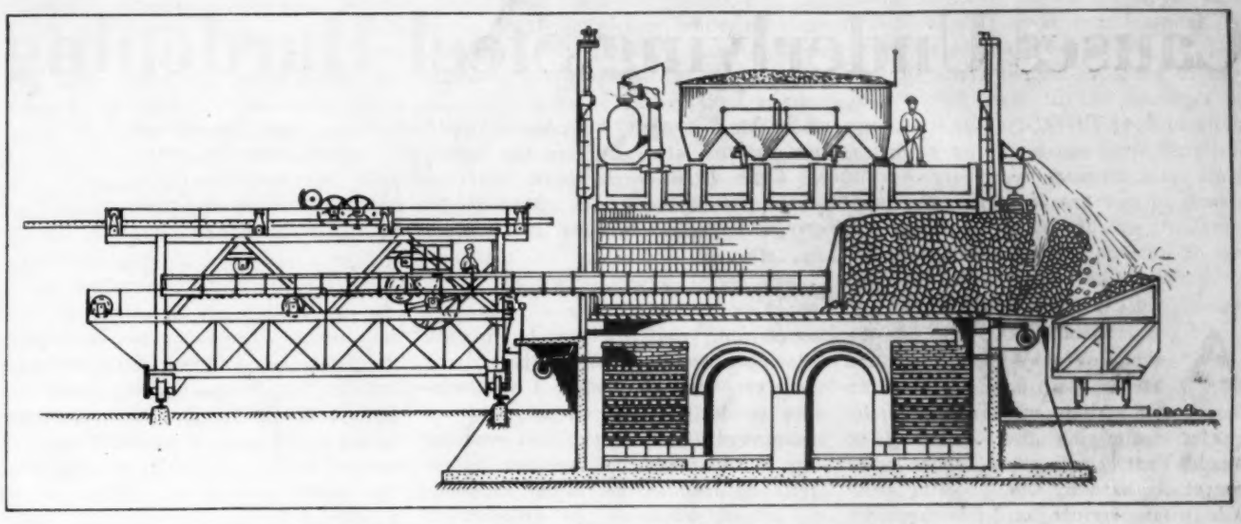


FIG. 5—VERTICAL CROSS SECTION THROUGH SOLVAY COKE OVEN

the maintenance of uniform conditions as regards the flow of gases and the flue temperatures. The high velocity of the gases sweeping through the flues tends to prevent the formation of cold or hot spots within the oven chambers.

The products of combustion, after leaving the oven flues, pass through regenerators into the main chimney flues and then through a 200-foot brick stack. The reversal of air and gas through the regenerators is controlled by an automatic reversing mechanism, which operates two simple plate dampers at the chimney base.

Ample provision is made for coal storage, in order to provide against irregularities in delivery. The operation of a by-product oven plant being essentially continuous, interruptions and irregularities are costly. Ample shop, storehouse and other auxiliary facilities have been installed. A washhouse and first- aid apparatus are also provided.

## Vanadium Not a Scavenger

A considerable misunderstanding, it is said, exists among users of high grade steels as to the function of vanadium as an alloy, many persons believing that this metal is primarily a scavenger or deoxidizing agent. It is now believed that vanadium's effect on steel is due to what remains in the alloy and not to what is lost through various causes. While any readily oxidizable metal might broadly be considered as a deoxidizer, it should not ordinarily be so considered unless it is used intentionally for this purpose. The cost of vanadium, it is declared, will always be such that the losses due to oxidization will not be adequately compensated for by the value of the scavenging work performed, in view of the low cost of other efficient scavenging agents. For this reason, care should be exercised, particularly in the open hearth and bessemer processes, to see that the steel is as thoroughly deoxidized as possible before the addition of ferro-vanadium. When this alloy first came into vogue, the losses were excessive. This was largely due to a lack of understanding of the composition of the ferro-vanadium and of the proper method for its addition to the steel. Beneficial results attained by the use of the alloy led to the hasty conclusion, on the part of metallurgists and steel makers, that the excessive losses were due entirely to the deoxidizing effect of the vanadium. Improvements in the composition of ferro-vanadium, as well as in methods of using it, have shown that it is possible to prevent much of the apparent oxidation loss, so that the greater part of the vanadium will alloy directly with the steel.

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Where water is used in automobile cylinders in the type of grinders where the wheel travels around the surface of the cylinder, trouble is often experienced by the collection of mud in the bottom of the cylinder.

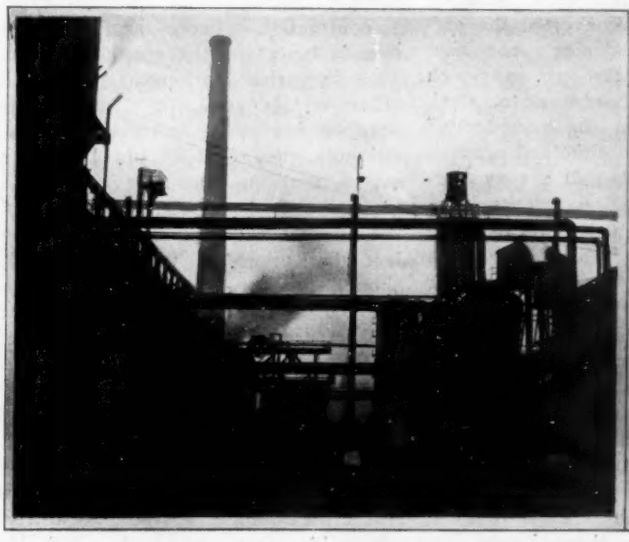


FIG. 6—POWER PLANT OF KENTUCKY SOLVAY COKE CO.

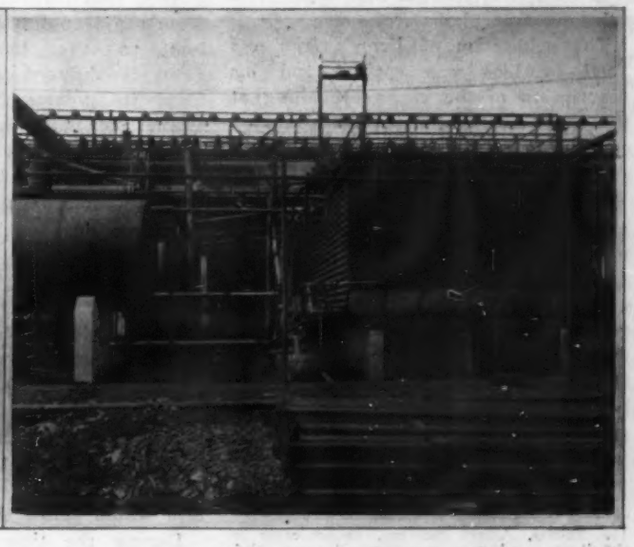


FIG. 7—BY-PRODUCT RECOVERY PLANT

# Causes Underlying Steel Hardening

*ALTHOUGH the phenomena of steel cooling by various methods have been familiar to mankind for countless generations, it is only in the past half-century that the causes underlying its hardening have been understood. According to the author of this article, present explanations of the results obtained are based on three different theories, including allotropy, solid solutions, and existence of strains in quenched steel.*

By Albert Sauveur

AS A CONTRIBUTION on the metallography of iron and steel, I propose to consider briefly the various explanations of the causes underlying the hardening of steel. That certain steels can be made extremely hard by rapid cooling from a high temperature, as for instance, by quenching the red-hot metal in water, has been part of men's knowledge for thousands of years. There is no record, however, of any very early attempt at explaining the phenomenon.

### *Phlogiston Theory*

During the phlogiston period it was held by many that steel was iron that had been loaded with phlogiston by heating it in contact with combustible substances, and that in order to retain in the metal as much phlogiston as possible, thereby increasing its hardness, it was necessary to cool it very quickly, on the ground that slow cooling permitted the escape of some phlogiston with corresponding loss of hardness. It is not without interest to note that this crude conception has at least one point of resemblance with many of the modern theories, namely, the necessity, in order to harden steel, of retaining in the cold, through rapid cooling, a substance or a condition which is normally present in the metal at a high temperature; they called it phlogiston, while it is now described as beta iron, solid solution, amorphous iron, etc.

The publication of Percy's *Iron and Steel* in 1864 was epochal and his description of the views prevailing at the time concerning the phenomenon of the hardening of steel, is worth quoting:

"In molten, or even in strongly heated solid steel, the carbon is wholly combined, or, possibly, simply dissolved; and by sudden solidification of the metal in the one case, or sudden cooling of it in the other, the whole of the carbon remains diffused through the mass. However, the carbon may have separated notwithstanding, and exist in a state of infinitesimally fine division; and it is conceivable that it may be in the allotropic condition of graphite, and may yet, owing to what I will venture to designate an atomic state of disaggregation, be capable of entering into combination with nascent hydrogen, and produce the residue supposed to be indicative of the presence of what is termed *combined* carbon. Whether this view be correct or not, it is certain that hard and soft steel differ essentially with regard to the mode of existence of the carbon in the mass. The particles of hardened steel are obviously in a state of tension, which may, probably, be analogous to the particles of glass in the unannealed state; and, if the former were transparent, the polariscope would, it is reasonable to suppose, reveal a structure similar to that which it renders manifest in the latter."

It is very interesting to observe that many of the assumptions upon which modern theories are based were familiar to Percy, namely, the existence of carbon in a combined and dissolved form (an early conception of solid solutions), the retention by sudden cooling of carbon in a diffused condition and the existence of tension or strains in quickly cooled steel.

### *Ackerman's Compression Theory*

In 1879 Ackerman attempted to explain the hardening of steel on the ground that the compression resulting from rapid cooling converted the carbon to the hardening condition (Percy's diffused carbon) in which form it imparts hardness to steel. While the belief in the presence of hardening, that is, dissolved, carbon in quenched steel is still a very general one, the conception that its foundation is due to the compression to which the metal is subjected on quenching is hardly to be entertained. All evidences, on the contrary, point to the hardening condition being the normal form of carbon above the critical range of the metal and to its being retained by quick cooling, because such treatment denies the necessary time for its transformation into the cement or non-hardening condition stable below the critical range.

During the time that elapsed between the publication of Percy's book and that of Howe's famous *Metallurgy of Steel*, in 1890, but little progress appears to have been made in solving the problem under consideration. Howe mentions as a probable cause of the hardening of steel, the retention, by quick cooling, of carbon in its hardening form. He writes: "I gave reasons for believing that at or about cherry-redness the carbon of steel passes almost wholly into the hardening state, combining with the whole of the matrix of iron present to form a compound, which, when cold, is intensely hard and much stronger and more brittle than pure iron, and which is preserved by sudden cooling." He also considers the severe strains resulting from the hardening operation owing to "dissimilar rates of contraction" as a possible cause, contributary at least, of the hardness produced by rapid cooling.

### *Tension as a Factor*

Howe also alludes to the "diamond theory", which holds that by sudden cooling the carbon present in steel is converted into diamond, an hypothesis hardly deserving of consideration.

During the days preceding the advent of metallography it was loosely contended by many that the hardness of quickly cooled steel was due, as already mentioned, to a state of severe tension or stress created by the rapid cooling, owing to the different rates of contraction between the center and outside layers of the quenched piece. The fact that carbonless iron and other metals and alloys cannot be sensibly hardened by rapid cooling, although they also should be under severe tension, does not appear to have disturbed the mental repose of the advocates of the theory, nor the fact that according to their view it should not be possible to harden razor blades, nor again, the fact that a difference of some 10 degrees Cent. in the quenching temperature suffices to produce great increase of hardness at the higher, and complete absence of increase at the lower, temperature.

In 1890 Osmond announced his discovery of the occurrence of two thermal critical points in the purest iron obtainable, from which he logically concluded that iron existed in three

Presented at a recent meeting of the International Engineering Congress, San Francisco. The author, Albert Sauveur, is professor of metallurgy and metallography, Harvard University.

allotropic conditions, namely, *gamma* above the upper critical point, *beta* between the upper and lower point, and *alpha* below the lower point. He showed by scientific reasoning of a high order that the hardness of quickly cooled steel might be ascribed to the retention in the metal of some beta iron, a variety which he believed to be extremely hard. Osmond argued that gamma iron was non-magnetic, moderately hard and very difficult to retain in the cold; that beta iron was non-magnetic, very hard and readily retained in the cold metal by rapid cooling; and that alpha iron was magnetic and soft. Since carbonless iron cannot be hardened by sudden cooling and since hardened steel is magnetic, it was necessary to assume that the presence of carbon is necessary to prevent, during quick cooling, the transformation of beta iron, and that even after quick cooling some alpha iron is present in the metal. The physical properties of manganese steel, which is free from thermal critical points, and which was found to be—as it should be, in accordance with the theory—non-magnetic and hard after slow cooling, afforded a striking support of Osmond's theory.

While Osmond's views found at first many followers, some metallurgists doubted from the start the existence of beta iron, and the number of unbelievers has been on the increase ever since. It has been argued that beta iron has in reality no existence, (1) because, as a matter of fact, the second thermal point described by Osmond does not exist in strictly pure iron, a contention which has been definitely refuted by Dr. Burgess of the bureau of standards; (2) because of the absence of any crystallographic change corresponding to the formation of beta iron, a view which arbitrarily assumes that an allotropic change must necessarily be accompanied by a change in crystalline structure; (3) because, except for a change in magnetic properties, no discontinuity has ever been shown to occur in any of the properties of iron at the beta point, an assertion opposed to the findings of several investigators of repute; (4) because while a magnetic change occurs, that change is progressive and does not, therefore, indicate a real discontinuity, a contention which is open to challenge; and (5) because magnetic transformations are in a class by themselves and do not imply allotropic changes.

While in their eagerness to prove the non-existence of beta iron, some writers have stretched their scientific imagination to the breaking point in summing up their contentions, it would seem that they have failed in their purpose, their attacks having been directed, unconsciously no doubt, against the name rather than against the substance. They are all compelled to admit that between the gamma variety existing normally above the upper critical point and the alpha variety normal below the lower point, the condition of iron *between the two points is neither gamma nor alpha*—and that, after all, is the main feature of Osmond's theory. Whether instead of being called beta iron, that condition should be described as alpha iron holding carbon in solution, non-magnetic alpha iron, amorphous alpha iron, interstrained alpha iron, etc., does not, as a matter of fact, affect the vitality of Osmond's theory. It remains true that in order to harden steel, the metal must be kept, partially at least, in a non-gamma, non-alpha condition. To call it the beta condition certainly makes for simplicity of speech. If I understand them correctly, these recent theories, without exception, hold that to harden steel we must, through quick cooling, retain the condition existing during the thermal critical range; while some (the stress theories) maintain further that that condition is *created* by rapid cooling through the range. The former ascribe to rapid cooling the retention only of the hardened condition, the latter its creation as well as its retention. These contentions can readily be reconciled with Osmond's theory.

The stress theory was greatly strengthened by Andre Le Chatelier and others, who argued that the well-known expansion accompanying the allotropic transformation of gamma iron into beta or alpha iron must necessarily result in a severe internal straining of the metal when this expansion is opposed by quick cooling. This reasoning explains satisfactorily why metals which do not undergo allotropic transformation, and in which, therefore, there is no spontaneous expansion on cooling at certain critical temperatures, cannot be hardened by quick cooling, but it does not explain why carbonless iron cannot be hardened.

That hardened steel is generally in a severely strained condition no one denies; that the strained condition contributes to the hardness of the metal may readily be conceded; that it is the sole cause of the hardening of steel through quick cooling is more difficult to accept.

Le Chatelier has never accepted as probable the existence of an allotropic condition of iron between gamma iron stable above the upper critical point of pure iron and alpha iron stable below its lower point. He prefers to attribute the hardness of rapidly cooled steel to the presence in the metal of carbon dissolved in alpha iron, the quick cooling permitting the transformation of gamma into alpha iron but causing the carbon to remain in solution. In his opinion this state of solid solution is sufficient to account for the great hardness of quenched steel, although alpha iron is soft.

Arnold claims the formation above the critical range of a carbide of iron, $Fe_3C$, containing, according to atomic proportions, 0.89 per cent carbon. In steel with less carbon, the carbide $Fe_3C$ forms a solid solution with the excess iron present; while in steel more highly carburized it forms a solution with the excess carbon. The carbide $Fe_3C$ is said to be very hard and its retention in the cold by sudden cooling causes the hardness of quenched steel. There are absolutely no evidences supporting this rather fantastic conception, whereas it is opposed by experimental facts as well as by theoretical considerations. It is advocated by Arnold only and by some disciples educated by him.

Andrew McCance believes that on cooling steel quickly from above its critical range the whole of the carbon remains in solution while the bulk of the gamma iron is converted into alpha iron, in this respect following Le Chatelier. This alpha iron, however, according to McCance, is in an interstrained condition owing to the fact that its crystalline units have been denied the time to assume an homogeneous orientation, and the hardness of quenched steel is due to this interstrained condition. It is further contended that, contrary to some recent views, strained iron cannot be described as amorphous because if it were amorphous it could not be ferromagnetic—"interstrain" being a better term to describe its condition. McCance writes: "On quenching steel, the carbon is retained in solution and in turn it retains a proportion of the iron in the gamma condition, but the majority of the iron is alpha iron. At the quenching temperature the crystal grains had the crystalline symmetry of gamma iron, and the gamma iron retained in the quenched state by the carbon will form an internal network in these original steel grains. The rest of the iron will be transformed, and will form crystal units of alpha symmetry, but these will be prevented by lack of time, by internal friction, and by the gamma iron network, from arrang-

ing themselves to form homogeneously oriented alpha crystals.

*"The alpha iron will be in a condition similar to interstrain, and great hardness will result."*

According to J. C. W. Humfrey, "the hard structure which can be produced in carbon steels by quenching and in certain alloy steels by normal cooling, is due to the presence of a hard amorphous solution of alpha iron and iron carbide, which solution may be compared to Beilby's amorphous phase formed by overstrain.

"To explain the formation of this amorphous phase, the author advances a theory that the passage of a substance from one allotropic modification to another of different crystalline form involves the temporary formation of an amorphous state, corresponding to the liquid phase of the modification about to be formed. In steels such a change occurs at the critical thermal point; and if due to sudden cooling or to the presence of certain alloyed elements, the change point is lowered to a temperature below that at which crystallization in the viscous mass becomes difficult, then the amorphous form will be retained in a meta-stable form in the cold."

Carpenter and Edwards argue that, in quenching steel, very severe internal stresses are set up, causing internal straining of the metal, which in turn results in the formation of numerous twins and of hard amorphous layers. The markings of martensite, in their opinion, correspond to these twins. Edwards writes: "That the material is internally strained is evident from the facts which have been published, namely, the metallic crystals are broken up into an exceedingly large number of twin lamellae. Further we believe that the hardness produced by quenching is brought about by crystal twinning and possibly direct slipping and the formation of amorphous layers as a result of the internal deformation."

It will be obvious from the foregoing that the many recent attempts at arriving at a satisfactory explanation of the hardening of steel are based on one or more of the following conceptions: (1) Existence of a hard allotropic variety of iron, (2) existence of solid solutions involving the occurrence of so-called "hardening" carbon, and (3) existence of strains in quenched steel causing or not an amorphous condition of the iron.

It will likewise be obvious that no theory so far presented fully satisfies our craving for a scientifically acceptable explanation of the many phenomena involved.

It would seem as though the methods used to date for the elucidation of this complex problem have yielded all they are capable of yielding and that further straining of these methods will only serve to confuse the issue, a point having been reached when this juggling, no matter how skillfully done, with allotropy, solid solutions and strains is causing weariness without advancing the solution of the problem. The tendency of late has been to abandon the safer road of experimental facts and to enter the maze of excessive speculations, in which there is great danger of some becoming hopelessly lost.

The conclusion seems warranted that new avenues of approach must be found if we are ever to obtain a correct answer to this apparent enigma.

TWO-LADLE, 200-TON OPEN HEARTH FURNACE AT PLANT OF PHOENIX IRON WORKS

## Two-Ladle Furnace

The Phoenix Iron Co., Phoenixville, Pa., has recently installed an additional two-ladle open hearth furnace of 200 tons capacity. Four two-ladle furnaces are now operating at the Phoenix plant. The hearth of the new furnace is 42 feet long and 15 feet 9 inches wide. The metal is tapped into the two ladles simultaneously through a bifurcated spout and the stream is so regulated that the ladles are supplied with equal quantities of metal. This company is now constructing a fifth furnace of this type which will be ready for making steel about March 1. Using cold stock, each of these furnaces turn out an average of 1,000 gross tons of ingots per week.

## Cambria Steel Co. Exhibit

The Cambria Steel Co., Johnstown, Pa., had an attractive exhibit at the Panama-Pacific International Exposition, which closed in San Francisco Dec. 4. Probably the most interesting feature of the display was the original Kelly steel converter used at the Cambria works in 1861 and 1862. This was the first converter to be employed in the manufacture of bessemer steel in the United States. A pair of polished steel axles which had been twisted together cold also formed a center of interest. In addition, the Cambria company displayed samples of the unusually varied line of rolled sections which it manufactures, including numerous special shapes for agricultural implement makers, automobile manufacturers, and others. A full line of wire products also was exhibited, together with a large number of steel specialties, including railway supplies and automobile accessories. The Cambria Steel Co. was awarded a silver medal for its exhibit of field and poultry fence. It also received a medal of honor for its display of railway supplies and gold medals for its exhibits of agricultural tools and automobile accessories.

# Hydraulic Stripping on the Cuyuna

*THIS INTERESTING method of removing the overburden on iron ore deposits was utilized at the Rowe and Hillcrest mines. Two large centrifugal pumps, each actuated by a powerful alternating current motor, and two heavy sand pumps, also motor-driven, were used at the Rowe mine, a total of 1,500,000 cubic yards being moved at an average of 6.7 cents per yard. Methods used at the Hillcrest mine were similar.*

By Edward P. McCarty

FIG. 1—HYDRAULIC STRIPPING AT HILLCREST MINE

THE Pittsburgh Steel Ore Co. in 1913 introduced at the Rowe mine the hydraulic method of removing overburden on iron ore deposits. The use of water at the Rowe and Hillcrest mines was not only feasible, but also economical because of the location of the ore bodies and the character of the overburden. Reference to Fig. 5 shows a plan of the ore body and vicinity at the Hillcrest mine. Conditions quite similar prevail at the Rowe mine, where the top of the overburden lies at considerable elevation above the water and the top of the ore is about 20 feet below the water. The ore and the pit are now protected from flooding by a clay dike. The Rowe mine is adjacent to Little Rabbit lake, where the water pump, with a capacity of 3,500 gallons per minute, was placed. The water was pumped through about 1,500 feet of 12-inch pipe to the point chosen for excavation. Here the pipe was reduced and an ordinary hydraulic giant was fitted. The size of the giant nozzle was varied for the different materials encountered, but

Presented at the recent meeting of the Lake Superior Mining Institute.

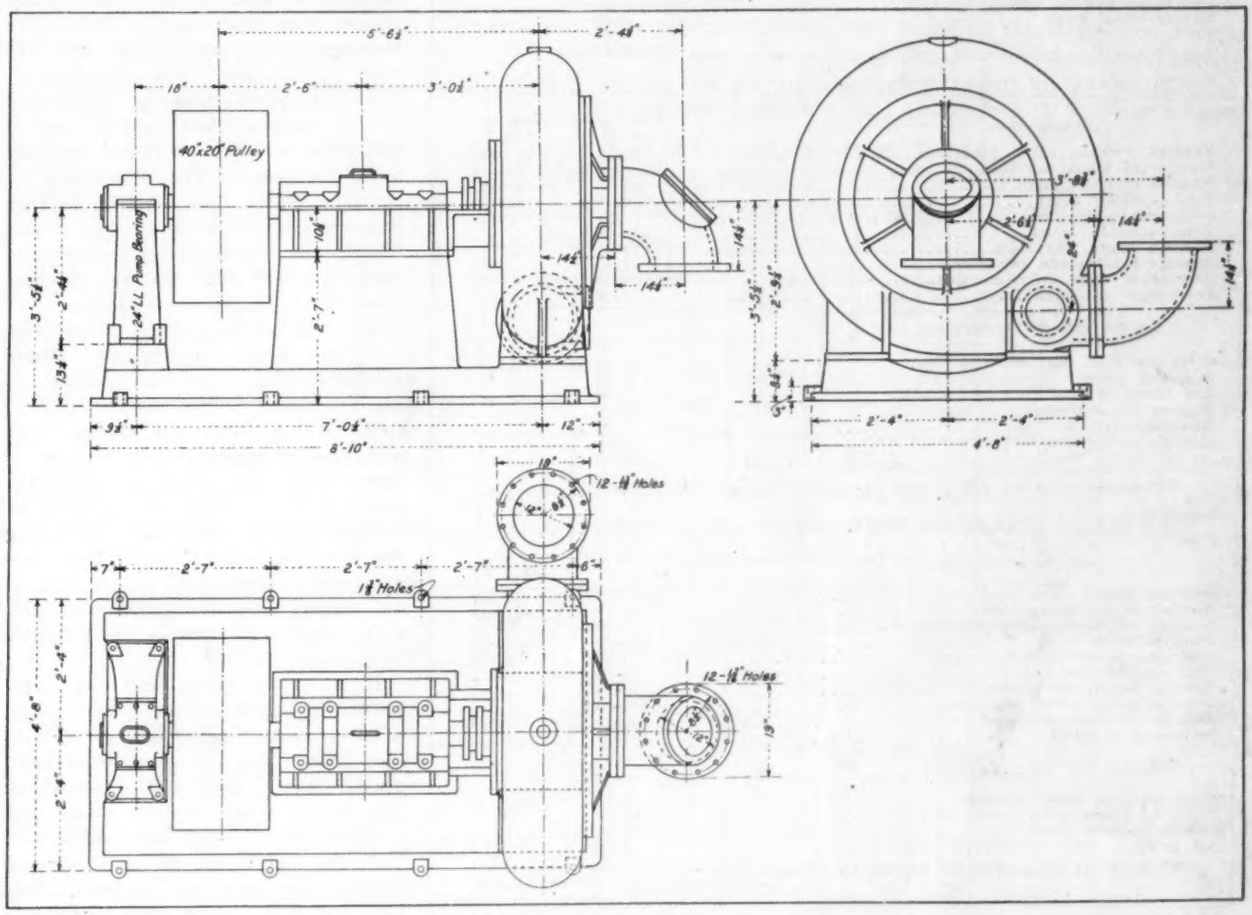



FIG. 2—DETAILS OF SAND PUMP AT ROWE MINE

**Table I.**

SUMMARY OF OPERATIONS FROM MAY 5 TO JUNE 1, 1915.

| | May 5 to June 1. | Total to June 1. |
|---|---|---|
| *Yardage moved, cu. yds. | 77,704 | 96,127 |
| Number of hours day shift, min. | 201–17 | 253–24 |
| Number of hours night shift | 241–37 | 298–57 |
| Total working hours | 442–54 | 552–21 |
| Cubic yards per hour, cu. yds. | 175 | 174 |
| Total possible hours | 532–00 | ..... |
| Average hours per shift | 9–51 | ..... |
| Average cu. yds per shift | 1,728 | 1,502 |
| Amount of water delivered, gals. | 95,832,000 | 126,312,000 |
| Percentage of solids | 16.4 | 15.4 |
| **CAUSES OF SHUTDOWNS** | | |
| Moving pipe line, min. | 12–47 | ..... |
| Repairing pump | 29–20 | ..... |
| Hot thrust bearing (not in journals) | 36–29 | ..... |
| Packing pump | 2–05 | ..... |
| Inspection | 2–20 | ..... |
| No power | 4–30 | ..... |
| Changing runner | 1–00 | ..... |
| | 88–31 | |

*7,296 cu. yds. moved May 1 to May 5, making a total of 85,000 cu. yds. for May.

SUMMARY OF OPERATIONS FROM JUNE 1 TO JULY 1, 1915.

| | June 1 to July 1. | Total to July 1. |
|---|---|---|
| Yardage moved, cu. yds. | 59,728 | 155,254 |
| Number of hours day shift, min. | 222–15 | 476–44 |
| Number of hours night shift | 275–30 | 573–12 |
| Total working hours | 497–45 | 1049–56 |
| Cubic yards per hour | 120 | 148 |
| Total possible hours | 648–00 | ..... |
| Average hours per shift | 19–12 | ..... |
| Average cubic yards per shift | 1106 | ..... |
| Amount of water delivered, gallons | 81,833,900 | 208,145,000 |
| Percentage of solids | 14.8 | ..... |
| **CAUSES OF SHUTDOWNS** | | |
| Work on pipe lines, min. | 54–25 | ..... |
| Lowering scow | 16–05 | ..... |
| Repairing pump | 72–40 | ..... |
| Hot thrust bearing (not in journals) | 3–25 | ..... |
| Miscellaneous stops | 3–40 | ..... |
| | 150–15 | |

SUMMARY OF OPERATIONS FROM JULY 1 TO AUGUST 1, 1915.

| | July 1 to Aug. 1. | Total to Aug. 1. |
|---|---|---|
| Yardage moved, cubic yards | 68,195 | 223,449 |
| Number of hours day shift, minutes | 263–50 | 740–34 |
| Number of hours night shift | 286–40 | 859–52 |
| Total working hours | 550–30 | 1600–26 |
| Cubic yards, per hour | 124 | 138 |
| Total possible hours | 696–00 | ..... |
| Average hours, per shift | 10–21 | ..... |
| Average cubic yards, per shift | 1,275 | ..... |
| Amount of water delivered, gals. | 107,017,200 | 315,163,100 |
| Percentage of solids | 13.0* | ..... |
| **CAUSES OF SHUTDOWNS** | | |
| Work on pipe line, minutes | 47–15 | ..... |
| Repairing pump | 30–35 | ..... |
| Hot thrust bearing (not in journals) | –30 | ..... |
| Waiting for and setting up pump | 66–05 | ..... |
| Miscellaneous | 1–30 | ..... |
| | 145–30 | |

*Allowance made for 200 gallons per minute seepage into the pit.

SUMMARY OF OPERATIONS FROM AUGUST 1 TO SEPTEMBER 1, 1915.

| | Aug. 1 to Sept. 1. | Total to Sept. 1. |
|---|---|---|
| Yardage moved, cubic yards | 95,539 | 319,589 |
| Number of hours, day shift | 294–10 | 1034–44 |
| Number of hours, night shift | 345–40 | 1205–32 |
| Total working hours | 639–50 | 2240–16 |
| Cubic yards per hour | 149–00 | 142–00 |
| Total possible hours | 720–00 | ..... |
| Average hours, per shift | 10–39 | ..... |
| Average cubic yards, per shift | 1592–00 | ..... |
| Amount of water delivered | 137,537,600 | 452,700,700 |
| Percentage of solids | 13.2 | ..... |
| **CAUSES OF SHUTDOWNS** | | |
| Work on pipe lines, minutes | 50–15 | ..... |
| Repairing pump | 11–00 | ..... |
| Setting up new pump | 10–50 | ..... |
| No power | 8–05 | ..... |

Allowance of 200 gallons per minute for seepage from the pit.

for the average work a 4-inch nozzle was used.

The water pressure at the nozzle was about 50 pounds. The stream was directed against the bank and the material was washed down a rough channel to where a 12-inch Morris sand pump was located. The suction of the sand pump picked up all the water and sand material and pumped it out through a 12-inch pipe to the spoil bank. The discharge pipe of the sand pump varied in length from 500 feet to 2,400 feet. The vertical distance from where the sand pump picked up the material to where it deposited it on the spoil bank was 27 to 40 feet.

It was found that the material brought down by the hydraulic giant could be washed down to the sand pump on a grade as flat as 4 feet in 100 feet. By locating the sand pump on a platform in one place the giant was worked all around the pump in a gradually increasing circle until this 4 per cent slope was reached. With an average depth of 54 feet, this limit was not attained until the giant had swept a circle around the pump having a 1,350-foot radius.

For a short time at the beginning of the operation a plunger type of pump was used on the clear water or pressure line, but it was soon abandoned, for the reason that the work of the giant was irregular, requiring frequent stopping. This could not be accomplished in the case of the plunger pump without shutting down the pump. The pump was located at some considerable distance from the giant and in practice it was found that telephonic communication was inadequate for the smooth running of the pumping apparatus.

On replacing the plunger pump with the two-stage centrifugal pump, shown in Fig. 6, it was possible to get a pressure at the nozzle equal to that obtained with the plunger type and also a more steady stream of water with the advantage that the giant could be shut off partially or totally without materially increasing the pressure in the line. When operating with 50 pounds of pressure at the pump, total closing of the gate valve showed an increase of 18 pounds of pressure on the gage.

It is to be noted that the overburden at the Rowe mine, as in most of the Cuyuna range, is easy to handle, being fine and unconsolidated glacial drift. There is also, just above the ore, a more or less tough and compact layer of clay intermixed with iron ore and layers of sand carrying considerable nests of boulders. This overburden at times was excessively

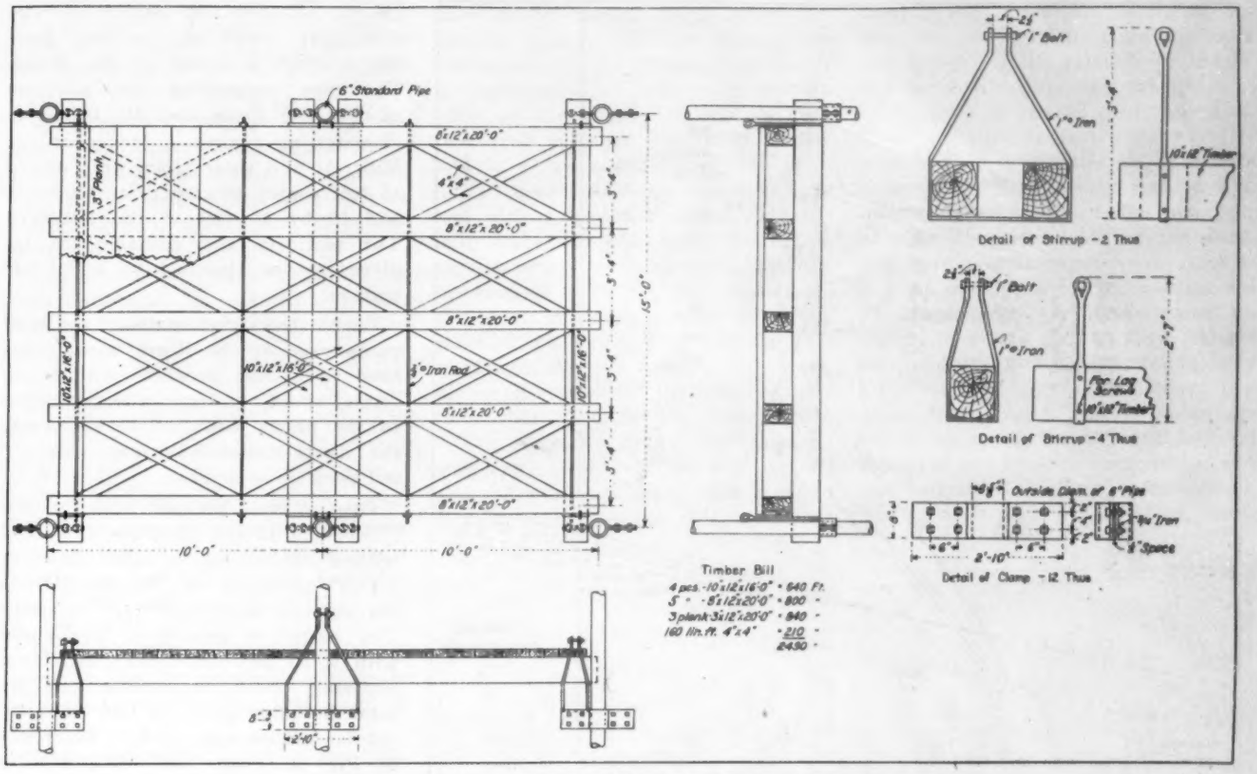



FIG. 3—SAND PUMP PLATFORM AT HILLCREST MINE

sticky and tenacious. Steam shovels handled it with difficulty when the clay layers were first encountered. The first work, the sluicing, resulted in the removal of 81,000 cubic yards of rather free running overburden. The work was done in August, 1913. As the hill was washed away the returning stream of water gradually carried less and less of a load of material down to the lake. The sluicing was then abandoned and the hydraulic

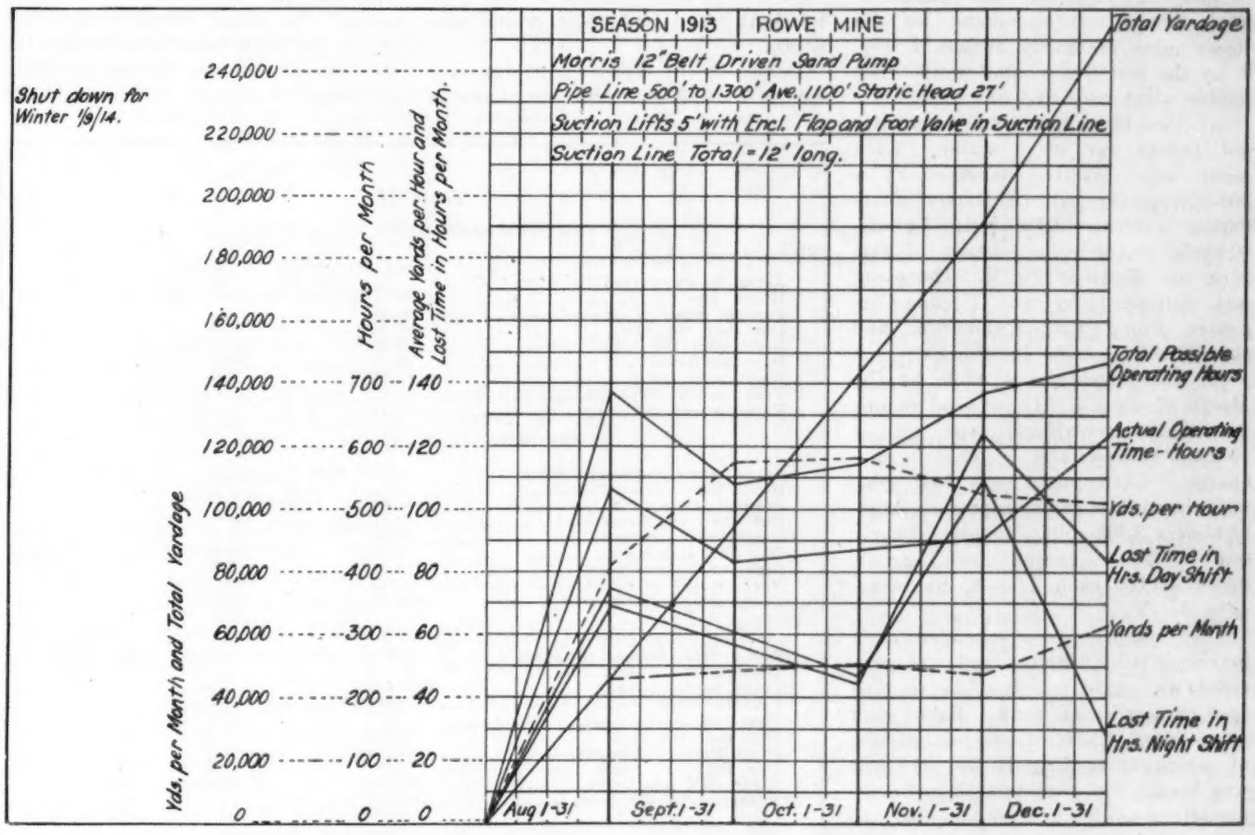



FIG. 4—SUMMARY OF OPERATIONS AT ROWE MINE FOR FIRST FIVE MONTHS

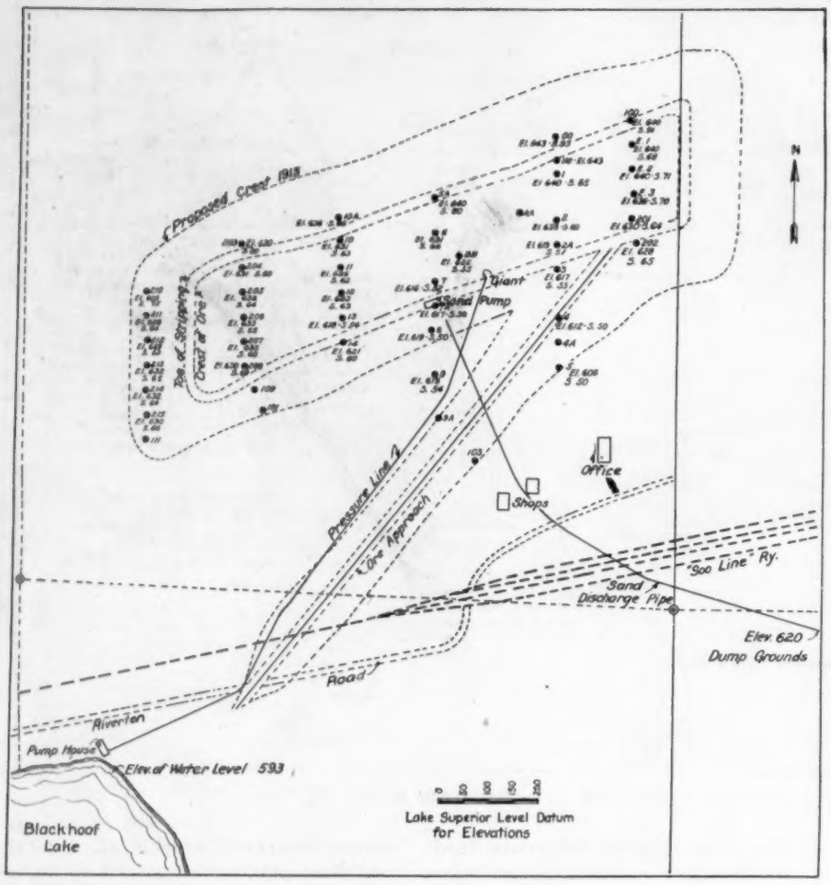



FIG. 5—PLAN OF HILLCREST ORE BODY

method of stripping was instituted. The summary of operations for the Rowe mine are fairly shown in Fig. 4 for the first five months' work. The double plant consisted of:

(a) Two 10-inch, two-stage centrifugal pumps for clear water. Each pump was directly connected to a 200-horsepower Allis-Chalmers alternating current, 2,300-volts, 3-phase, 60-cycle motor. The details of this pump are shown in Fig. 6. The pump was furnished by the Epping-Carpenter Pump Co., Pittsburgh, and cost $2,625, f. o. b. Pittsburgh.

(b) Two sand pumps made by the Morris Pump Co. These sand pumps are of the centrifugal type with a 12-inch suction and a 12-inch discharge. Each pump was belt connected to a 250-horsepower Allis-Chalmers 2,300-volts, 3-phase, 60-cycle motor. These pumps cost approximately $1,000 each, f. o. b. Baldwinsville, N. Y.

The discharge pipe extended to a maximum of 2,400 feet and was provided with gate valves so as to produce an artificial head. Each sand pump lifted 3,500 gallons per minute, of which approximately 10 per cent was sand. The pipe was 12 inches in diameter, spiral riveted, number 16 gage steel, made by the American Pipe Co. The total cost of this pipe for both sand and clear water was $2,000.

Details of the type of platform, etc., used at the Hillcrest mine are shown in Fig. 3. The plan used at the Hillcrest mine was somewhat modified from the original designed at the Rowe. The pipe supporting the platform used at the Rowe was 4½ inches in diameter as against 6 inches at the Hillcrest and these pipes were placed 16 feet center to center at the Rowe and 10 by 16 feet at the Hillcrest. The platform was subsequently replaced at the Hillcrest by a flat car bottom.

Fig. 2 shows the details of the sand pump used at the Rowe mine. This sand pump was provided with a variable speed motor, belt connected to the pump, while at the Hillcrest the direct connected type of motor and pump is in service.

Due to the heavier work at the Hillcrest, a 12-inch sand pump is used with a 300-horsepower Allis-Chalmers motor operating at 505 revolutions per minute under 2,300-volt current. The motor is geared to the pump with a 50 per cent speed reduction slip ring. Both the pressure and the sand discharge lines are laid on fairly regular grades and curves. Reference to Fig. 5, where the topography is shown, will illustrate this. The sand discharge line is equipped with bolted joints and can be given a considerable curve both vertically and horizontally. This considerably increases the friction head and causes heavy wear on the pipe where the bends occur. As usual, check valves are placed on both pipe lines where the pipe bends over into the pit to admit air when the pump is closed down

**Table II.**

PERFORMANCE CARD NO. 1 PUMP.

| | | Day. | Per cent. | Night. | Total. |
|---|---|---|---|---|---|
| Actual hours worked by pump | ..... | 285.25 | .... | 360.75 | 646 |
| Hours idle | ..... | 38.75 | .... | 11.25 | 50 |
| Possible hours | 696.00 | ..... | .... | ..... | ... |
| Day shift run hours | 285.25 | ..... | 41.0 | ..... | ... |
| Night shift run hours | 360.75 | ..... | 51.8 | ..... | ... |
| Day shift lost | 38.75 | ..... | 5.6 | ..... | ... |
| Night shift lost | 11.25 | ..... | 1.6 | ..... | ... |
| Yard moved in month | ..... | 40,000 | .... | ..... | ... |
| Yards moved per hour | ..... | 61.9 | .... | ..... | ... |

PERFORMANCE CARD NO. 2 PUMP.

| | | | | | |
|---|---|---|---|---|---|
| Actual hours worked by pump | ..... | 249.75 | .... | 342.00 | 591.75 |
| Hours idle | ..... | 74.25 | .... | 18.00 | ... |
| Possible hours | 684.00 | ..... | .... | ..... | ... |
| Day shift run hours | 249.75 | ..... | 36.5 | ..... | ... |
| Night shift run hours | 342.00 | ..... | 50.0 | ..... | ... |
| Day shift lost hours | 74.25 | ..... | 10.9 | ..... | ... |
| Night shift lost hours | 18.00 | ..... | 2.6 | ..... | ... |
| Yards moved in month | 75,000 | ..... | .... | ..... | ... |
| Yards moved per hour | 126.70 | ..... | .... | ..... | ... |

The best performance was that of pump number 2 in June 1914, as follows:

| | | | | | |
|---|---|---|---|---|---|
| Actual hours worked by pump | ..... | 215 | .... | 292 | 497 |
| Hours idle | ..... | 97 | .... | 78 | 175 |
| Cubic yards moved | 102,000 | ..... | .... | ..... | ... |
| Possible hours | 672 | ..... | .... | ..... | ... |
| Time lost | 175 | ..... | .... | ..... | ... |
| Day shift run hours | 215 | ..... | 32.0 | ..... | ... |
| Night shift run hours | 282 | ..... | 42.0 | ..... | ... |
| Day shift lost hours | 97 | ..... | 14.4 | ..... | ... |
| Night shift lost hours | 78 | ..... | 11.6 | ..... | ... |
| Yards moved per hour | 205.20 | ..... | .... | ..... | ... |

and to permit the draining of the lines into the pit. The pressure at the nozzle is 70 pounds per square inch.

A total of 1,500,000 cubic yards was moved hydraulically at the Rowe mine at an average cost of 6.7 cents per cubic yard. This cost covers labor, supplies, upkeep and office expenses.

The labor necessary consisted of one motorman, one suction tender, one nozzleman and two laborers. The nozzleman was paid 35 cents per hour, the others 30 cents per hour. The power necessary, which was 450 horsepower, was paid for at the rate of 1¼ cents per kilowatt-hour. The cost of labor (about one-half that of power) plus the cost of power, allowing for a reasonable repair item, was 4 cents per cubic yard. The repair on the sand pumps was not excessive and would average about $125 per month.

Details of the performance of pumps 1 and 2 are clearly shown in their record for October, 1914, given in Table II.

Operations were begun at the Hillcrest mine on April 22, 1915. Between that date and May 1 the work was principally devoted to getting the pumps started and experimenting with various devices. Eleven thousand one hundred and twenty-seven cubic yards of material were moved during that time.

The operation is planned to remove 1,000,000 cubic yards by hydraulic stripping. It is yet too early to arrive at a cost statement, but conditions and equipment being similar to those at the Rowe, the writer is of the opinion that the cost will be nearly identical.

The summary of the operations from May 1 to Sept. 1, shown in Table I, is complete and of considerable interest.

It is interesting by way of comparison to know that in the pebble phosphate district of Florida the hydraulic method of removing the overburden and also of removing the pebble phosphate is used exclusively, some of the larger companies employing as many as 25 of these different dredging units at one time. Up to the present time it has been the custom to use 10-inch pumps in the phosphate fields for this work, but some 12-inch pumps are now being installed.

The depth of the overburden is shallow in the phosphate region compared to that in the iron mines, the average being about 20 feet, and as the bed of phosphate is also shallow, the sumps into which the materials are washed by the hydraulic giant have to be moved much more frequently than in the iron mines. For this reason in the phosphate mines it is customary to use long suction lines on the pump. A suction hose is placed next to the suction disc on the pump and through the flexibility gained by this suction hose and with a suction line that is gradually increasing until about 200 to 250 feet is reached considerable area can be covered with the one setting of the pump and several different sumps reached with this long suction line. It is customary to also carry a much higher pressure on the giant nozzle than that used in the iron mines.

The economic limits for hydraulic stripping are very sharply defined and the work can easily be carried to a point which ultimately leaves too much hand work. Experience at the Rowe mine has shown that it is advisable to leave 6 to 8 feet of surface on top of the ore body to be cleaned up later by the steam shovel.

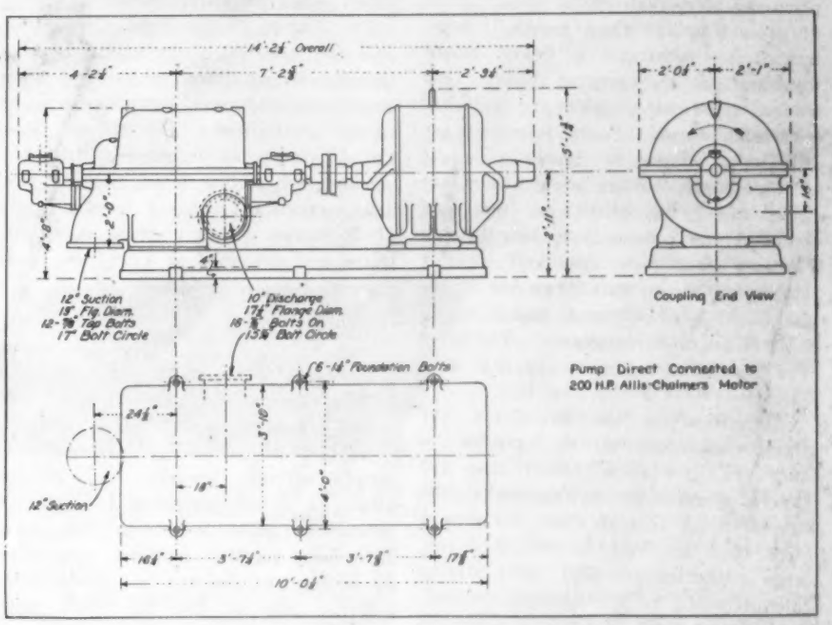



FIG. 6—TWO STAGE CENTRIFUGAL PUMP EMPLOYED AT ROWE MINE

## Book Review

*The Structure and Properties of Materials of Construction*, by G. B. Upton, assistant professor of Experimental Engineering, Sibley College, Cornell University; 327 6x9-inch pages; cloth; published by John Wiley & Sons, Inc., and furnished by *The Iron Trade Review* for $2.50 net.

This book is an outgrowth of the laboratory course in materials of construction given to juniors in Sibley College. The aim of the book is to give the theory of the subjects of the laboratory experiments, while the experiments themselves with the accompanying discussion between instructors and students show the facts and bring out the relation of theory and facts to engineering practice.

The book is divided into two parts. The first part deals with the determination of properties of materials by means of engineering testing. The internal phenomena of the structure of materials under load are explained. The ordinary formulas for calculation of stresses and deformations are examined, with the assumptions on which they are based, their ranges of validity, and the direction and magnitude of their errors after they cease to be valid. There is an attempt to teach the student how to interpret and criticize test results, and to formulate binding specifications. The second part of the book deals with the nature of the internal structure of materials and the control of their properties, through the control of the structure. The principles of physical chemistry concerned in heat treatment are outlined, with many diagrams to make relations clear.

Certain features of the book are, so far as the author is aware, either entirely new or have never before been given in a simil r way. Such are the general analyses for finding the true stresses after the elastic limit in torsion or transverse loading, and the description of heat treatment from the standpoint of physical chemistry as a controlled chemical reaction. The new analysis of torsion and transverse loading is already giving results which may clear up the controversy over "Guest's" law or other laws of failure.

# How to Test the Lenses of Goggles

*THE DAYS when cheapness was the first consideration with a foundry owner progressive enough to buy goggles for his men, have passed. Nowadays the use of goggles is universal, and foundrymen have found that it pays to equip their operatives with the best eye protection procurable. The use of wire mesh protectors is now being abolished. Mr. King here graphically describes methods of testing various types of goggles.*

By F. W. King

FEW foundrymen realize the tremendous advances made in the last few years in the design and construction of goggles used to protect the eyes of chippers and other foundry operatives. A comparatively short time ago almost anything in the form of a 10-cent spectacle was considered quite proper, and only recently has the importance been realized in using lenses of ground optical glass, especially heat-treated to withstand a heavy blow. Contrary to the general belief, only a few types of goggles are provided with such lenses. Some foundries are still using masks or protectors made of wire mesh, but as a rule, they are being rapidly abolished, as the men complain that constantly looking through a screen tires their eyes and it is a fact that a screen cuts down the illumination 30 per cent and makes vision bad enough to be dangerous. The price of a goggle no longer is the first consideration.

Competition is too keen for the goggle manufacturer to charge a fancy price for them. More than 100 types of goggles are on the market, the cheapest being sold at about 75 cents a dozen, and the best, at $11 a dozen. Large quantities are sold on a sliding scale according to the number ordered. The cheaper type is worth possibly 75 cents, certainly no more. Like anything else, one receives just about what he pays for. The finest goggles are the best value to be had for the investment. Costing a little over 90 cents a pair wholesale, the same quality of goggle would retail at about $2.50.

No large concern, progressive in safety work, considers anything but the best. Frequently, the loss of an eye, through the use of improper goggles, costs enough to properly equip a country with goggles, to say nothing about the humanitarian features of the case. Generally speaking, the largest manufacturers are furthest advanced in safety eye protection and on account of the great hazard involved in the employment of a large number of men they have demanded better and stronger goggles than were previously employed.

Portions of a paper presented at the twentieth meeting of the American Foundrymen's Association, Atlantic City, N. J., Sept. 28-Oct. 1.

The first requirement was that the entire frame, including temples, etc., had to be made of metal that would neither tarnish nor rust, so that it could be properly disinfected. This was not an especially difficult proposition and it was successfully worked out. Now the entire frame, including the screens, is made of special German silver alloy, which meets all requirements.

The United States Steel Corporation was the first to adopt a standard of required strength for lenses, and other large manufacturers have drawn up similar specifications. The Illinois Steel Co., Chicago, has designed a drop test machine for testing lenses with a steel ball, magnetically relieved from a height of 21 inches. This machine was illustrated and described in *The Iron Trade Review, Dec.* 31, 1914.

### *How the Test is Made*

The test is made as follows: Out of every gross of goggles received, one dozen are selected at random and the lenses of 25 per cent of these must stand, without breaking, 15 21-inch blows of a ball weighing 16.25 grams. When the glass is broken the pieces must hang together and not splinter or fly in towards the eye. If the goggles will not pass the test, the whole shipment is refused. While some lenses would pass this test, it was agreed by manufacturers and users that stronger lenses would be desirable and as the result of a large amount of research, lenses have been developed which will withstand a much greater impact than that provided by the Illinois Steel Co.'s specifications.

The workman's compensation service bureau and the compensation inspection rating board of New York recognize the importance of the use of goggles and respirators in industries where the eyes and lungs of the workmen are exposed, by allowing a 1 per cent credit on the insurance rate. The clause referring to this credit in the universal analytic schedule follows:

"In all industries where necessary, and where workmen are furnished with approved types of goggles and where those engaged in dusty places are furnished with respirators, 1 per cent credit on insurance rate is allowed."

The importance of this cannot be overestimated. Realizing the cost of goggles, the recognition of the liability companies is certainly a fair one and offers financial inducement to the employers to furnish their employes with eye protectors of approved types.

In addition to the standard already outlined, the Underwriters' Laboratories have adopted specifications which form a part of this paper. The specifications of the Underwriters' Laboratories only recently have been issued and they are much more rigid and exacting than those previously adopted.

It might be added that there has been considerable criticism of the drop test as not reproducing correctly the blow of a chip of steel traveling at a great velocity. A similar test of lenses is made by the use of a pendulum, and by lengthening its swing, any desired impact may be reproduced. Lenses which satisfactorily pass the drop test also pass the pendulum test.

Lenses have been developed which not only will pass the impact test of a 1-ounce ball, ⅝ inch in diameter, but will not break from the force of a blow of a 9-ounce ball, 1½ inches in diameter. The test is almost unfair, since the goggles are mounted rigidly on a hard rubber pad, whereas in actual use, when a blow is struck, there is a spring of the goggle in addition to the padding afforded by the skin and flesh of the wearer.

An outline of the new underwriters' specifications follows:

*Quality of Glass.*—All lenses should be of clear optical glass free from flaws (waves, air-bubbles, etc.) and ground on both sides. The lenses must not show a variation in thickness of more than 0.0040 inch. Fifty per cent of the submitted samples should be examined as outlined above.

*Size.*—The minimum allowable diameter of the lens on any axis is 1½ inches.

*Lens Replacement.*—The lenses should be so designed that replacement without injury to the frames is possible and should be distinctly marked so that no similar stock size of any inferior quality of lens may be substituted. Frames are to completely surround the lens and otherwise be so shaped that they will closely fit the face of the wearer. They shall be made of a material which is light and strong, and easily adjusted to

(*Continued on page* 112b.)

# The Mechanical Theory of Corrosion

*WHY DOES cast iron resist the ravages of oxygen so much better than wrought iron or steel? The authors of this article declare that corrosion is largely due to structural properties of the several forms of the metal. They argue that the stoppage of rust in cast iron is due to the fact of its distinct crystalline structure. After a rust coating has been formed between the crystals, it protects them from further oxidization.*

By R. C. McWane and H. Y. Carson

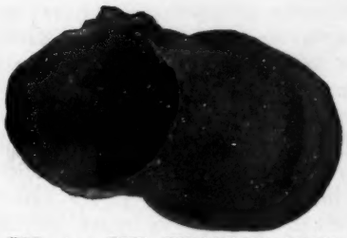


FIG. 1 — THE WROUGHT IRON PIPE, SHOWING EFFECTS OF CORROSION

FROM out the maze of chemical controversy of recent years as to the cause, or causes, of rust, stands the fact that cast iron resists the action, or actions, that prove so quickly and so completely destructive to wrought iron or steel, and with this fact chemists have never yet been able to reconcile their theories. In all the chemical, or electro-chemical theories so far advanced, cast iron has been shown to be most susceptible to rust, because of the larger percentage it contains of foreign matter, such as graphite, silicon, manganese, sulphur and phosphorus, yet the facts of history prove that while cast iron will become quickly coated with rust, it will remain practically unimpaired in weight and strength for hundreds of years under conditions that prove absolutely fatal to wrought iron or steel in 10 to 20 years. These facts indicate, therefore, that we must look to other than chemical causes for a satisfactory explanation of the phenomenon of rust damage, and the theory which seems to be most nearly in harmony with the facts, but which has received scant attention in the discussion of this subject heretofore, is that of the marked difference in *structure* between cast iron and wrought iron and steel. This difference is graphically shown in Figs. 4 and 5, these illustrations being reproductions of actual photomicrographs.

FIG. 2 — THE CAST IRON PIPE, STILL SERVICEABLE

Whatever may be the accepted theory of the actual process of rust, whether the hydrogen-peroxide, the carbonic acid or the electrolytic, the three most generally accepted theories at present, it is unanimously agreed that the process is a form of slow combustion, with the presence of oxygen as an all-important factor, and that if the material can be fully and permanently protected, to exclude oxygen, rusting will not take place.

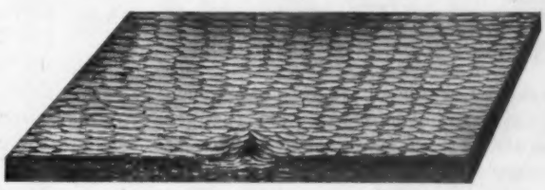


FIG. 3 — DRAWING OF A PIECE OF SHEET STEEL MUCH ENLARGED, SHOWING SURFACE AND SECTIONAL STRUCTURE WITH A TYPICAL PIT

*Structure of Cast Iron*

By reference to Fig. 4, it will be noted that cast iron has a distinct granular, or crystalline structure, a form common to all metals having undergone the simple process of smelting and cooling, which was one of the processes of nature in the formation of the ore, and it is this distinctive structure, in combination with the chemical, or electro-chemical, action taking place on the surface of the metal, which serves to stop that action after it has proceeded to a certain depth, and hold the result (ferrous oxide) as a permanent, oxygen-excluding protective coating. This stoppage of rust action results from the fact that the crystals, or granules, in cast iron are bound together at one or more points by a metallic bond, or bonds, and after a rust coating has been formed of the loose crystals on and near the surface of the metal, and the oxide penetrates between the crystals more strongly bound together, the force exerted by the absorption of moisture is not sufficient to separate the crystals, and the oxide remains as a permanent coating. The undisputed fact that from the moment we begin to manipulate cast iron by puddling and rolling, we lay down the barriers for the invasion of rust, and the further well-known fact that the thinner a sheet of wrought iron or steel is rolled the more rapidly it will succumb to the action of rust, leads to the conclusion that the change in structure brought about by such manipulation has a most important, if not altogether final, bearing on this much discussed question.

A paper read at the twentieth annual meeting of the American Foundrymen's Association, Atlantic City, N. J., Sept. 28-Oct. 1.

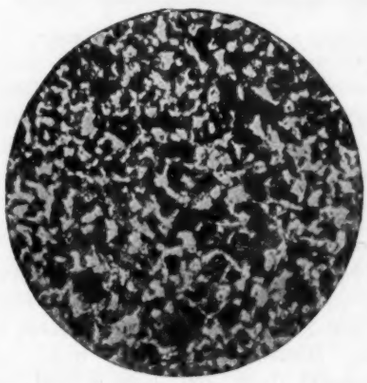


FIG. 4—PHOTOMICROGRAPH OF CAST IRON

FIG. 5—PHOTOMICROGRAPH OF WROUGHT IRON

Passing over the intermediate processes, from cast iron to the extreme of thinly rolled sheet steel, we find the structure of the metal to have changed from crystalline to fibrous and finally to distinct laminations, or leaves, and in each process of heat-

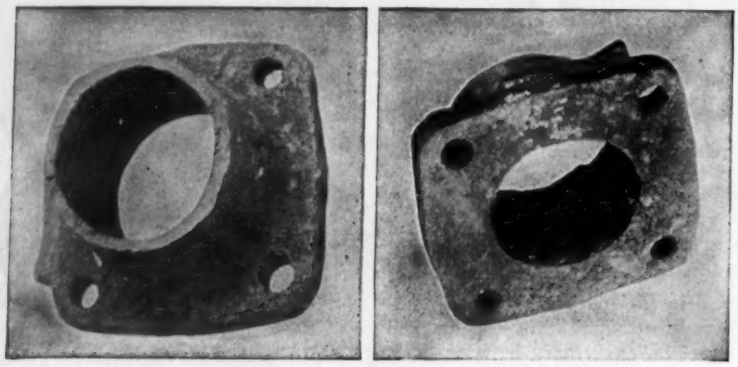


FIG. 6—PIECES OF CAST IRON PIPE FROM AN UNDERGROUND LINE INSTALLED BEFORE 1665

ing and rolling the natural bond found in the crystalline structure of cast iron has been further disturbed, until in the steel sheet we find the leaves bound together largely, if not altogether, by the force of compression, yet distinctly differentiated one from the other by the very small percentage of silicon always present but uncombined with the steel.

The rusting of steel is evidenced by a form of pitting and exfoliation, or flaking-off of minute particles of metal, exposing a new surface for attack, from time to time, until the entire section is affected. This can be clearly understood by reference to Fig. 3, which is from a drawing made to represent a piece of sheet steel, very much enlarged, showing a surface and sectional structure, and a typical *pit*, which is likely to occur at various points in sheets apparently well-protected with paint or other coating. Uncoated sheets will scale off much more uniformly, and despite the claims of various manufacturers in the past few years of having produced a coating that will successfully and permanently adhere to the smooth surface of rolled steel, rust damage to such steel goes on apace, especially in locations where it cannot be watched and the coating frequently renewed.

An important factor in the scaling-off or breaking up of the surface of rolled steel, and one which has seldom been considered heretofore, would seem to be the forces of expansion and contraction as offering a reasonable and satisfactory explanation of the rapid deterioration of such steel when exposed to sudden and violent changes in temperature. These changes, taking place on the surface of the metal before the interior portions are affected, tend to buckle, or stretch, the surface metal and to tear the laminations apart or open them up so that the rust action is accelerated. The change in structure from a crystal of appreciable size, bound to its fellows by a metallic bond, to an infinitesimally thin leaf, with no bond strong enough to resist the efforts of the rust coating to tear it away from its fellows, is a thoroughly understandable and logical explanation of the effect of rust on the two materials.

No more striking illustration of the lasting, or rust-resisting qualities of cast iron is afforded than the pieces of cast iron pipe shown in Fig. 6, the photographs having been taken in Paris, France, in 1909. These pieces of pipe are from an underground line installed prior to 1685 for the purpose of conveying water to the famous fountains in the Versailles park, and official report says that when taken up this pipe was "in apparently as good condition as when installed". Figs. 7 and 8 illustrate the relative effect of rust on cast iron and wrought iron. The cast iron shown here was used in the same service with the wrought iron and for the same length of time, and shows no sign of deterioration, while the wrought iron is completely reduced to the oxide. Perhaps no field affords a better means of studying iron pipe corrosion at first hand than pipe contained in the plumbing of buildings. First, this is due to the fact that both wrought iron and cast iron pipe have been installed and used in the waste lines of buildings during the past 20 years; second, old buildings are continually being torn down or remodelled, so that it is possible to obtain specimens of pipe which have seen long service; and third, when such a pipe line fails the sewer gases escape from it and render poisonous the atmosphere of the building.

Corrosion in waste and vent pipes is attributable to the moist condition of the air within the piping system, together with the hydrogen sulphide ($H_2S$) and carbon dioxide ($Co_2$), products of bacterial decomposition of sewage, which may be considered as dilute acid reagents attacking the internal surface of the pipe. Such are the normal conditions, analogous perhaps to the damp air of cellars where it is so common to note the corrosion of iron taking place at a fairly high rate. In many drains and vents the corrosive action is found to be even more severe than this. Where hot water or steam is discharged into the waste pipes, or where strong acids, disinfectants or other strongly corrosive substances are discharged along with the waste water into the lines, the corrosion of wrought iron or steel is accelerated and the lines break down in 5 to 10 years after being first put into use. To explain

FIG. 7—EFFECT OF RUST ON CAST IRON

FIG. 8—EFFECT OF RUST ON WROUGHT IRON

the wide difference that exists between the life of cast iron pipe and wrought pipe, none of the theories can be made to fit the facts. Indeed, they are in direct opposition to the facts.

Typical is the comparison offered by the installation illustrated in Figs. 1 and 2, which gives a comparison of the durability of cast iron and wrought iron soil pipe joined together and used in the same 5-inch

drainage for 18 years. The wrought iron pipe in all cases indicates a continuous peeling off of rust scales, until the whole section is destroyed, while cast iron pipe is unimpaired by the same corroding action which destroys wrought pipe. The cast iron pipe shows, when removed, a closely adhering rust coating on the surface, which undoubtedly prevents the destruction of the pipe. The loss in weight and original thickness of cast iron pipe by 18 years of service was something less than 1 per cent, while that of the wrought iron pipe was more than 72 per cent. It is not unlikely that the greater part of the 1 per cent loss in cast iron pipe actually took place during the first year the pipe was put into use, since this pipe is not tar-coated, and it is well-known that the surface of uncoated cast iron pipe corrodes very quickly. It is probable that uncoated iron pipe will show a higher initial loss by corrosion during the first few months of service than would be shown in the wrought iron pipe subjected to the same corrosive action during the same period of time.

Observing the manner in which all rolling mill products corrode, we must necessarily attach a great deal of importance to the microscopic structure of the iron. The same typical flaking-off of rust scales may be observed on rolled beams, round or square bars, or any other of the many products which are turned out of the modern rolling mill. In every case the material showing this typical flaking-off has a highly laminated structure, made so by the modern methods of its manufacture.

Ancient wrought iron or steel, and even that made 100 years ago, is known to have resisted corrosion much better than the modern wrought iron or modern rolled steel. There can be no question but that old iron does not have the same physical structure as the modern milled product, because ancient iron was smelted from the ore by crude methods into small-size pieces of metal and then hammered—not rolled—into its finished shape. Had the ancient iron been highly laminated like modern steel, it could not have lasted more than a few years.

## Interesting Fire Tests

In an interesting 32-page treatise recently published, the Berger Mfg. Co., Canton, O., describes a series of tests conducted for the purpose of determining the efficiency of its fire-resisting pressed steel floor construction system. A furnace, 10 x 12 feet in outside diameter, was provided with a grate consisting of T-rails, the distance from grate to ceiling being 9 feet 6 inches. The roof was of the company's metal floor construction. Four flues with dampers were installed, as well as draft doors. The exterior walls consisted of 13 inches of brick, the inside layer being fire brick. The joists were covered with a layer of the company's metal lath, faced with concrete, the under sides being similarly covered and faced with cement plaster. A temperature of 1,900 degrees Fahr. was maintained for more than four hours in the furnace, after which the fire was quenched with a heavy stream of water. The effects of the fire and water which were carefully noted, were said to be remarkably slight. The treatise describes additional tests of this company's products and includes numerous diagrams showing the results of the experiments, as well as temperature and deflection charts. Many photographs also are reproduced.

## Book Review

*Mechanical Engineers' Pocket Book*, by William Kent, revised with the assistance of Robert Thurston Kent; ninth edition; 1526 + xliv, 4 x 6¼-inch pages; leather; published by John Wiley & Sons and furnished by *The Iron Trade Review* for $5.00 net.

This well known volume needs no introduction to the iron and steel industry. For 20 years it has been the standard reference work of mechanical engineering in the English language and the new edition is fully up to the high standard set previously.

Since the eighth edition was published, five years ago, there have been notable advances in many branches of engineering, rendering obsolete portions of the book which at that time were in accord with practice. In addition, many engineering standards have been changed during the five-year period, necessitating a thorough revision of many sections of the work. The absolutely necessary revisions to bring the book up to date have involved changes in over 400 pages of the eighth edition and the addition of more than 150 pages of new matter. The treatment of many subjects in the earlier editions has been condensed into smaller space to enable the insertion of the new matter without increasing the size of the book to unwieldy proportions. Extensive revisions have been made in the subject of materials, mechanics, fans and blowers, heating and ventilation, fuel, steam-boilers and engines, and steam-turbine devices. The chapter on machine shop practice has been rewritten and doubled in size, and now covers many subjects which were omitted in earlier editions. The new matter includes many data on planing, milling, drilling and grinding, together with an elaborate treatment of the subject of machine tool driving. The subject of electrical engineering has been completely rewritten and brought into agreement with present practice. Of the new tables added the following are considered of special importance: Square roots of fifth powers; four-place logarithms; standard sizes of welded steel pipe, standard pipe flanges; properties of wire rope; fire brick and other refractories; properties of structural sections and columns; chemical standards for iron castings; flow of air, water and steam; analyses and heating values of coals; Rankine efficiency; cooling towers, properties of ammonia, power required for driving machine tools of all types, both singly and in groups; electric resistance and conductivity of wires; street railway installation; electric lamp characteristics; illuminating data.

## The Economy of Time

A paper on "Chronocyclegraph Motion Devices," presented by Frank B. Gilbreth and L. M. Gilbreth at the recent meeting of the Pan-American Scientific Congress, Washington, declares the great problem of this age to be the conservation of the human element. This problem, it is asserted, can be at least partially solved by eliminating useless, ineffective, and ill-directed motions. The process of this elimination demands the standardization of the motions used in all forms of activity, which standardization must be the outcome of applying accurate measurement to achievement. The chronocyclegraph motion devices described in this paper are measuring devices through which it is possible to visualize the methods by which successful achievement has been attained.

These methods of operation may be compared, and from them standard methods, composed of measured motions, may be derived. The benefits of such standardization are said to be not only that the individual using the motions can achieve greater output with the same amount of effort and fatigue, thus conserving his energy, but also that the nation to whom these motion-saving individuals belong can conserve its human element.

# Standardizing Air Furnace Practice

*EXPERIENCE has been the principal guide of malleable iron manufacturers in their development of the air furnace. The next step in its evolution towards an ideal efficiency must be the standardization and scientific study of the facts already determined. Mr. Pollard discusses the important factors of design and points out several disadvantages which remain to be eliminated, including the waste of labor and of heat.*

By A. L. Pollard

THE air furnace of today has been developed by many years of patient endeavor on the part of malleable founders. It has now reached a stage where improvement either must be very slow and must show year by year diminishing returns in added efficiency, or new methods and materials must be discovered. The scientific study and standardization of what has been already developed, for the most part empirically, will be the guide to the improvements of the future.

The air furnace has survived and has been developed to its present form by reason of its fitness under conditions as they actually are, which, by the way, is the highest reason for the survival of anything. Its inefficiencies may be deplored, but a great deal is asked from it. It must melt quickly, must be not too high in first cost and must be adaptable to a fairly wide range of capacity.

With the data now available, there is no reason why a furnace cannot be constructed which will work exactly the same every day under the same general conditions. The design is the first consideration. One dimension is limited, namely, the width. The furnace must be narrow enough to permit easy skimming as well as to allow the construction of easily supported bungs. This width is approximately 7 feet inside. The design is then confined to six main points, as follows:

1—Length of hearth.
2—Depth of bath.
3—Length of firebox.
4—Height of roof.
5—Opening at neck.
6—Wall thicknesses.

The length of hearth and depth of bath are mutually dependent. To design a furnace of any particular capacity, we may start with an average bath of 6 inches, which will give us quick melting, or of some other depth, such as 10 inches, which will give us slower melting and somewhat colder iron. For average practice the writer recommends a depth of 8 inches. With the tonnage, width and depth given, it is a matter of arithmetic to determine the length of hearth. The hearth should be deepest just in front of the bridge wall where the heat is most intense, and shallow at the neck where melting is much slower. The tap hole, of course, is located at the deepest point of the hearth.

A paper read at the annual convention of the American Foundrymen's Association, Atlantic City, N. J., Sept. 28-Oct. 1, 1915.

### *Grate Area*

The grate area is a factor of much importance and is entirely a matter of experience. This area can be determined in two ways. It has been found that the ratio of grate area to hearth area should be about 1 to 4. Also, since the melting ratio is 1 to 3 or better under forced draft, and since we should burn about 50 pounds of coal per square foot per hour, we can calculate the area in this way. If we should consider natural draft, we would assume only 30 pounds of coal per square foot per hour and a fuel ratio of 1 to 2½. With forced draft we would obtain a melting speed for a 10-ton furnace of about 4½ hours. Natural draft would be much slower.

The roof must be high enough to allow free passage of the flame when the furnace is charged with cold stock. In a 10-ton furnace this will be about 3 feet 6 inches at the deepest point. The roof should be no higher than necessary, as the most effective heating factor is in radiation from it. Also, it has been shown that gases are most effective in heating when moving at a high velocity. Obviously, the lower the roof, the greater this will be. The roof should be as nearly flat as possible, sloping gently down at the back. There is absolutely no advantage in the weirdly curved and indented roofs which some old furnaces have.

The opening at the neck is a point of great importance. It must be just right for successful operation. It is entirely dependent upon the volume of gases passing through the furnace and upon the draft. This opening, in a 10-ton furnace, should be about 3 square feet in area, but it should be adjusted as conditions of draft vary to always give a slight back pressure in the furnace. In other words, the total pressure of gases at this point should slightly overbalance the suction from the stack. Of course, in a natural draft furnace, this relation cannot be maintained, and consequently little or no air can be admitted over the bridge wall. The necessity for this back pressure is due to the fact that unless there is an appreciable pressure, a large amount of air is sucked in through the doors and roof, which tends to cool the furnace and greatly lower its efficiency.

The furnace walls may be either 9 or 13 inches in thickness. Thirteen inches is best and most economical. Less heat is conducted through them and at the slag line the inner 4 inches can be removed and replaced without disturbing the entire wall.

The possibilities for improvement in air furnace construction open an interesting subject for speculation. The disadvantages of the furnace may be briefly summarized as follows:

1—Exhausting labor of firing and skimming.
2—Large amount of heat lost in waste gases.
3—Large amount of heat lost through bungs.

The labor of firing has long been a difficult point in air furnace practice. It is difficult to get and keep good firemen. There are only three ways out of this difficulty, considering coal as fuel. One is, utilization of the open hearth furnace with regeneration, which we are not considering here. Another is in the use of automatic stokers. Some furnaces are equipped with these, which are giving satisfaction, but there is opportunity for much improvement. The writer believes that by far the most economical and best method of firing air furnaces is in the use of automatic stokers. A third method is by the use of pulverized fuel. This seems to offer possibilities, but it necessitates a large investment in equipment.

Concerning the heat lost in waste gases, unless we consider the open hearth, there is absolutely no opportunity for improvement in the furnace itself. To attain a melting temperature in the furnace requires that the waste gases leave the furnace at that temperature. The waste heat boiler offers a good method of utiiizing this lost heat, but this is outside our present discussion.

The heat lost through bungs also is difficult to overcome. Under pres-

(*Continued on page* 162b.)

# Business News of Nation's Capital

## Majority Members Divided as to Taxation Policy—Administration Hopes to Pass Shipping Bill—Attorney General and Business

EVENTS of the past week in congress show that renewed efforts to have the government declare an embargo against the exportation of munitions of war will fail utterly; that the ways and means committee of the house is entirely without a definite policy as to how to raise revenue to enact the preparedness program and that the government ship purchase bill will be urged by administration supporters for passage as quickly as possible. It appears to be the general opinion that the measure will pass the senate, after heated debate, but may be defeated in the house.

Discussion with regard to a munition embargo first grew out of a general debate in the senate on the international situation, and Senator Hitchcock, Democrat, of Nebraska, took occasion to contend that an embargo should be declared in accordance with a measure he has introduced with that purpose in view. Support given his contentions was mild and was offered by only two or three senators, while opposition to the plan was decidedly pronounced. Of those arguing most strongly against an embargo were Senator Lodge, Republican, of Massachusetts, and Senator Williams, Democrat, of Mississippi. Both senators cited international law showing that a neutral nation was entirely within its rights in allowing the exporting of munitions to belligerents, and, in fact, would be guilty of an unneutral act if it refused to do so. In the house Representative Gardner, of Massachusetts, made a vigorous argument holding that the United States makers of munitions are amply supported by international law in their right to export material to belligerents. He cited Secretary of State Lansing's note to Austria on this question as being an ideal paper outlining the situation with unassailable accuracy. No doubt the question will come up at different times before congress, but those supporting the embargo plan plainly represent a small minority and have no chance of being successful in their contentions.

There are those who, while not indifferent to, have cast aside the merits of the case, and want to see munition exports continued in the hope that a tax might be placed on their manufacture as one method of raising revenue necessary to enact the national defense program. Considerable interest has been manifested in a bill introduced by Representative Slayden, Democrat, of Texas, and referred to the ways and means committee, proposing a tax on explosives and for other purposes. This measure provides that every person who manufactures high explosives for himself or others shall pay a special tax of $120 per year.

### Without a Program

Just how serious may be the consideration given by the committee to the Slayden and similar measures is a question. The committee is admittedly without a definite program with regard to taxation, despite the recommendations made by President Wilson. Members of the committee have widely divergent views on the subject, Republicans generally favoring an upward and general revision of the tariff. Democrats are divided among themselves, although it is obvious that all of them hesitate to urge a comprehensive plan of direct taxation, one reason being the probable political effect. Suggestions looking to a general revision of the tariff would not be countenanced by administration supporters, who assert that, even if such action may be necessary, it will not be in order until after peace has been established in Europe and changed conditions are understood. Retention of the present duty on sugar, and opening of the chemical schedule, with a view to increasing duties on commodities in it and adding duties where at present there are none, to promote the dyestuffs industry in this country, are the only tariff changes decided upon or likely to be made, aside from the probable enactment of an anti-dumping clause. Chairman Kitchin of the committee is opposed to the preparedness program and therefore the proposed system of taxation, but will have to face the situation one way or the other. His rank and influence, however, make him a thorn in the flesh for the administration. There are other Democrats who favor the issuance of Panama canal bonds, a plan which is opposed by the administration. Representative Allen, Democrat, of Cincinnati, said he would favor such a plan, but apparently will not insist upon it. He said he had not given study to the proposed tax of 25 cents per ton on pig iron and a like tax on fabricated steel and was not in a position to pass upon the justice or injustice which it would mean to the iron and steel industry. Merely as a suggestion, rather than a conclusion, he said it might be found equitable to place a tax upon the net income of machine tool makers. Being from Cincinnati he has been in close touch with the business which the machine tool industry has been and is enjoying.

The belief is growing in strength that the specific taxation proposals made by the President will never be enacted into law, but will be considerably revised if a direct taxation plan is adopted, as seems probable. It is not thought by many, for instance, that the excessive tax proposed on the iron and steel industry will be approved by the committee and that, even if it were, congress would not ratify the committee's action. But it may be expected that a sharp fight may be made for such taxation by those who consider the steel industry a legitimate object for attack.

The administration hopes to introduce its government ship purchase bill in congress this week and to have it passed in the not distant future. The proposal of Representative Alexander, chairman of the committee on merchant marine and fisheries, to grant to the vessels to be leased by the government to ply in the coastwise trade will be an added point of contention against the measure. There are prominent Republicans in the senate who think it will pass that body, and say that, while they will assail it, no attempt at filibustering will be made. The reduced Democratic majority in the house apparently causes much quiet apprehension on the part of the administration that the bill may not pass the lower branch. With a solid vote cast, and all Republicans against it, a bolt within the Democratic ranks would defeat the bill, inasmuch as 13 represents the "balance of power". Ostensibly, however, administration supporters pretend to have the utmost confidence that the bill will be enacted into law, and think the McAdoo strategy, by which provision is made for the creation of a so-called naval auxiliary, has won added proponents

for the measure.

The administration is also desirous of getting quick and favorable action on its bill, introduced by Senator Tillman, for the erection by the government of a plant for the manufacture of armor plate "and other materials". There is dissension within the senate committee on naval affairs with respect to this bill. Chairman Tillman had called a meeting of the committee for last week to discuss the bill, but no quorum was mustered and a hearing for today was called. The Republican members of the committee appear to be against the bill.

### Denies Report

Secretary Daniels, denying published reports, told *The Iron Trade Review* that armor plate makers had not called upon him during the week with the suggestion that they would reduce the cost of armor for this government if they were awarded contracts covering requirements for the proposed five-year naval program. It has been stated, however, that the manufacturers have been in Washington with the idea of urging the plan mentioned. Mr. Daniels said that, regardless of whether such a suggestion was contemplated or not, the armor plate bill would be pushed for passage, and he expressed confidence that it will become a law in virtually its present form. He said that he did not want to see private makers deprived of business, but on the contrary favored giving them contracts, wherever it could be done at proper prices. Further, he expressed the hope that the present armor plate plants would continue in business, even if the government plant is erected, and said business would be given private makers if they could make the armor at prices less than those at which material could be produced by the government. He implied that it was desirable to have the armor plate capacity in this country increased anyhow. He also indicated that the proposed government plant would manufacture gun forgings, projectiles and probably other material.

## Gregory's Position

Washington, Jan. 11. The summary given out yesterday by the federal trade committee of the chamber of commerce of the United States from authoritative interviews with Attorney General T. W. Gregory with regard to the government's attitude toward business was prompted by inquiries made of the national chamber by business interests of the country. It puts the department of justice in the position of giving substantial recognition to the provisions of paragraph E of section 6 of the federal trade commission law authorizing the commission upon application of the attorney general to investigate and make recommendations for the readjustment of the business of any corporation alleged to be violating the anti-trust acts so that it may conduct its business in accordance with law. It is stated that persons entering into transactions in good faith, having good cause to believe them lawful, will not be criminally prosecuted, but if their business be found violative of the law, they will be given opportunity to readjust in conformity with the law without legal proceedings, unless consent decree in a civil suit is desired.

The summary continues:

"In cases as to which both the department of justice and the federal trade commission have jurisdiction, such for example as those arising under the Clayton act, the department will await the conclusion of the commission's proceedings as to any matters in which the commission's jurisdiction is first invoked.

"It is not improbable that the working arrangement between the department of justice and the federal trade commission is to follow along the same lines as have been established by custom as between the department and the interstate commerce commission with relation to violations of the act to regulate commerce, as a result of which arrangement the department rarely, if ever, institutes proceedings without the recommendation or sanction of the interstate commerce commission."

Mr. Gregory spoke of the misrepresentations and misunderstandings with regard to the Sherman law and pointed out that it is enforced by the department of justice in the same manner and according to the same rules of policy as other statutes.

Concerning the so-called area of doubt around the Sherman act, Mr. Gregory said in the vast majority of cases it is not difficult to tell whether a proposed transaction is or is not in violation of the statute, and the doubt is certainly no greater than that which is accepted as a matter of course in the application of other laws.

Such doubt as there is, he further stated, will be greatly reduced by decisions in the shipping pool case, the anthracite coal cases, the International Harvester Co. case, the United States Steel Corporation case, and the United Shoe Machinery case, which are now pending in the Supreme Court.

## Ore Rate Hearings

Washington, Jan. 11.—Hearings before the interstate commerce commission with regard to its investigation into ore rates from lower lake ports to furnaces in western Pennsylvania, Ohio, West Virginia and Kentucky were resumed today and probably will continue three or four days. Cross examination of witnesses representing furnace interests was taken up, and it may be that the commission expert will submit added testimony. It is not known whether the railroads will offer evidence further than that which is already in the records.

## Forges and Furnaces of Early Days

An exceedingly handsome volume entitled Forges and Furnaces in the Province of Pennsylvania has been issued by the Pennsylvania Society of Colonial Dames of America. The volume, which was written by the committee on historical research of the society, takes up the history of the early days of the iron industry in the keystone state and tells about the men who laid its foundation before the time of the war of the Revolution. The volume does not undertake to describe processes or to deal in a technical way with the making of iron. It is content to give glimpses of the lives of the men and describe with the aid of many halftone engravings the forges and furnaces which were built before 1776. Some of the halftones show the very comfortable homes of the early iron masters, others give an idea of the beautiful scenery of the great state, and still others show stove plates and other products of the ancient iron works. One extremely interesting series of pictures shows the different kinds of Franklin fireplaces.

Among other things, the volume shows that financial troubles played a large part in the struggles of iron-making in the early days. As the authors say, "The wonderful natural resources of the province of Pennsylvania—the great ore bodies, the thickly wooded country giving endless charcoal and the strong streams promising water power — impelled many capable and hopeful men to attempt the making of iron, and to the lives of these men, the 188 pages of the volume are largely devoted. Besides capacity and hope, however, money was needed for even the smallest beginnings and in going over the records one finds in many cases that a few years sufficed to bring the undertaking either to permanent grief or a new owner."

# News of Employers and Employes

## Steel Corporation and Other Companies Announce Advances in Wages—

## Profit Sharing Plan of Cleveland Twist Drill Co.

ABOUT $15,000,000 will be added to the annual labor bill of the United States Steel Corporation as a result of the voluntary increase of 10 per cent in the wages of unskilled labor and proportionate advances among other classes of employes, which was announced by Chairman E. H. Gary Jan. 6 to be effective Feb. 1. The increase will give the individual employe of the Corporation the largest return for his services in history. The average wage in salary per man of the employes during the past two years has been $905 per annum. In 1914, the number of employes was 179,353 and the total wages in salary $162,379,907; in 1913, the number was 228,906 and the total payment $207,206,176. The totals of 1913 were the highest of any year.

Judge Gary's announcement of the wage advance is as follows:

"In view of the prosperous conditions now existing it was unanimously voted at a meeting of presidents of our iron and steel companies, held today, to recommend that there should be made adjustments of the wage rates to take effect Feb. 1; and at a subsequent meeting of the finance committee it was unanimously decided to adopt the recommendation of the presidents. It is proposed to increase the rates of common labor about 10 per cent. As to other departments, increases will be equitably proportioned.

"Adjustments in wage rates in our mining companies are under consideration."

### Other Advances

Every important manufacturer of steel products in this district has advanced or soon will increase wages to meet the general wage scale offered by the United States Steel Corporation. Several independent concerns increased wages Jan. 1; after Feb. 1 nearly uniform wage scales will prevail in rolling mills in western Pennsylvania.

As previously reported in these columns, molders employed in a large number of foundries in the Pittsburgh district, went on a strike Dec. 13, demanding an 8-hour day, with pay for a 9-hour day. While the strike has not been settled, yet most plants have been able to operate in part the last couple of weeks and it is believed the strike gradually will become a thing of the past. Laborers employed at the plant of the Standard Steel Car Co., at New Castle, Pa., have returned to work, having accepted an increase in wages, offered by the company. Men employed at the Cannonsburg Steel & Iron Works, Cannonsburg, Pa., who demanded a 9-hour day and increases in pay, ranging from 40 to 60 per cent, are returning to work. It is not believed the situation in Cannonsburg is serious. No serious labor trouble exists at any of the plants in the Pittsburgh district at this time.

#### Abide by Definite Standard

Blast furnace managers in western Pennsylvania and eastern Ohio have notified employes they will pay the standard wage rates as soon as a definite standard is established. No formal advances have been made by independent blast furnace interests, but it is believed that the scale offered by the United States Steel Corporation at its blast furnace plants will become the standard in this district. A number of cokemakers in the Connellsville regions have advanced wages the last few months to meet the scale offered by the H. C. Frick Coke Co., a Steel Corporation subsidiary.

The Brier Hill Steel Co. and the Youngstown Iron & Steel Co. early Friday morning posted wage advances of 10 per cent to common labor at their various works in Youngstown, Niles and Lowellville, and their employes expressed themselves as satisfied.

This also was said to be true of the employes of the Carnegie Steel Co., at its Ohio works, upper and lower mills, all at Youngstown, following Chairman E. M. Gary's announcement Thursday afternoon.

### Profit Sharing Plan

The Cleveland Twist Drill Co., Cleveland, has put into effect a system of profit sharing with employes, as shown by the following resolution adopted by the directors:

Whereas it has long been the opinion of the directors of The Cleveland Twist Drill Co. that the welfare of a business is best served when the interests of the employes are linked as closely as possible with the success and prosperity

And whereas The Cleveland Twist Drill Co. has, in the judgment of the directors, reached a point in its development where a division of the profits with its employes may with safety be undertaken

Be it resolved that the following plan for sharing with the employes the profits of the company be and hereby is adopted:

1. Before any profits are divided with employes the stockholders shall receive 8 per cent per annum.

2. When the above 8 per cent interest has been paid to the stockholders in any calendar year, all cash dividends subsequently declared in that year will be divided between

First—the stockholders on the amount of their stock interest, and

Second—the employes on the amount of the salary or wages earned by them during the 12 months ending June 30 of that year, as follows:

A. Employes who have been continuously in the service of the company for at least two years prior to July 1 will receive dividends at the same rate as the stockholders.

B. Employes continuously in the service for more than one year and less than two years prior to July 1, will get three-fourths of that rate.

C. Employes who have served continuously for less than one year will get one-half the rate to stockholders.

D. Dividends that have accrued to employes will be distributed once a year in December, except that dividends for the year 1915 will be distributed in January, 1916.

3. No person will be entitled to a share in these dividends unless he is a bona fide employe of the company in good standing at the time of their distribution; except that employes laid off owing to lack of work or sickness will be entitled to the dividends accruing in any year on the wages earned by them during the 12 months ending June 30 of that year.

4. Employes voluntarily leaving the service of the company, or dismissed, or discharged, will forfeit their right to any accrued dividends.

5. Any employe who may receive a commission from the company or any share in the profits other than as provided for in this plan (except through dividends on stock if a stockholder) shall thereby be rendered ineligible to receive dividends under this plan.

6. All employes—except those noted in the three preceding sections—shall be eligible to share in dividends under this plan.

7. The above plan for division of profits is purely voluntary on the part of the company and is in no sense a contract. The right is, therefore, reserved to the directors to make at any time, without restriction, such changes in the plan as they may consider desirable for the best interests of the organization. The fact that any employe is receiving the benefits of this plan shall not deprive the company of the right at any time to discharge such employe and thereby terminate

his participation under the plan, nor shall any employe acquire any right thereunder to any accounting by the company concerning its business or profits.

## Labor Troubles

The strike of about 500 machinists and toolmakers at the "river" plant of the New England Westinghouse Co., Chicopee Falls, Mass., which was called three weeks ago, has been declared off, the strikers voting unanimously to accept the recommendations of the Massachusetts state board of conciliation and arbitration and return to work. The settlement follows a public hearing in Springfield by the board which occupied several days. The recommendations are that the company reinstate the men without prejudice or discrimination, and that it furnish Patrick J. Guerin, the steward whose discharge precipitated the strike, with employment. The state board would not recognize the other demands of the men, but took the matter of reinstating Mr. Guerin as the principal grievance of the strikers.

From 750 to 1,000 men employed at the Jersey City Works of the Crucible Steel Co. of America, have struck for a 15 per cent increase in wages and a reduction of the work day from 10½ to 9 hours. The plant, which has been operating at full capacity, now is crippled.

About 500 non-union machinists employed by the Providence Engineering Co., Providence, R. I., went on strike Jan. 6 because of a new plan to put all employes on piecework basis, which, they claimed, would result in a reduction of wages. Union labor leaders declared they would not assist the strikers, who went to that city several weeks ago to accept work.

The foundry of the North & Judd Co., New Britain, Conn., has started up, after being shut down since Dec. 20 on account of the strike. Two hundred molders went out at that time because the company discharged an employe for fighting. No demands were made upon the company, but it was a sympathetic strike because of the discharge of an employe. Nearly all the men have now returned to work.

The union machinists and polishers, numbering several hundred, employed by the Westfield Mfg. Co., Westfield, Mass., formerly the Pope Mfg. Co., through a committee, have presented their demands to the company. The main features of the requests are an eight-hour day, time and a half for overtime work and double time pay for holidays and Sundays. The polishers want 50 cents an hour as wages, but the machinists are asking for the eight-hour day and other concessions.

Union machinists of Bridgeport, Ct., have contributed more than $1,000 to the labor defense fund to protect members of the craft from discrimination during next summer and to fight the battle for the eight-hour day. This amount was gathered in December through voluntary contributions. Five months more remain before the fund will be closed, and at the rate at which it has begun, more than $6,000 is expected to be at the command of the union when the eight-hour fight is renewed.

Excepting the Rice, Barton & Fales Machine & Iron Co., where there is a strike of several months standing, foundry owners of Worcester, Mass., have been asked by the Iron Molders union to increase the pay of their employes beginning Feb. 7, from $3.25 to $3.50 for a nine-hour day. The union has a membership of about 500, represented in every foundry in that city.

## Elect Officers

Massachusetts manufacturers who have organized under the name of the Associated Industries of Massachusetts, to improve and protect the industries of that state, as previously announced in *The Iron Trade Review*, have elected the following officers:

President, Richard H. Rice, General Electric Co., Lynn.; first vice president, Adolph W. Gilbert, Chapman Valve Mfg. Co., Indian Orchard; treasurer, Frederick H. Payne, Greenfield Tap & Die Co., Greenfield; executive council, the president, the first vice president and William H. Gleason, Revere Rubber Co., Chelsea, Arthur C. Hastings, American Writing Paper Co., Holyoke, and Gifford K. Simonds, Simonds Mfg. Co., Fitchburg.

## Its Largest Bonus

The Reed-Prentice Co., maker of machine tools, Worcester, Mass., paid its fourth war bonus to employes Jan. 1, $10,000 being distributed, making the total to date $32,000. It was participated in by 775 employes, including the 550 men in the two machine shop departments, the others being those in the foundry and office force, everybody getting a share except Vice President and General Manager Albert E. Newton, who is classed as an official. This is the largest bonus yet paid by the company and is evidence that it is fast recovering from the machinists' strike of Sept. 20 in that more men are now at work than at any time since the strike. The company is running overtime until 9 o'clock each night and also on Saturday afternoons.

## Ask Wages Board

Toronto, Jan. 11.—A deputation of the Canadian trade and labor congress headed by President J. C. Watters, interviewed the Canadian government on the question of the wages and labor conditions in connection with the manufacture of war munitions. They complained that in many works the pay was not equal to that received for other government work and asked for the appointment of a wages board independent of the imperial munitions board charged with the functions of investigating wages and other conditions of labor in all establishments where shells, clothing and other war supplies are made.

## Labor Notes

The New Jersey Zinc Co. has posted notices in four languages at its properties in Franklin, N. J., announcing that during 1916 it will pay a bonus of 10 per cent of their yearly wages to all employes who have worked for that company a year or more. The bonus will be made in four payments, in January, May, August and December.

## How to Avert Shortages in Steel

Methods to avert the present shortages of steel required for automobile purposes, were discussed at the midwinter meeting of the Society of Automobile Engineers, held at the Engineering Societies building, New York City, on Jan. 5 and 6. One line of effort which it is hoped to promote this end was the proposal to modify and to render less rigid, the present specifications which the steel makers are obliged to meet. The iron and steel division recommended a number of changes and additions to the present specifications. Important proposals were made respecting the selection of specimens and tests. John S. Unger, manager of the central research bureau of the Carnegie Steel Co., Duquesne, Pa., presented a paper on the effect produced by varying the sulphur content of basic open hearth steel. Dr. Unger showed that considerably greater latitude in the sulphur content could be allowed without materially affecting the quality and strength of the steel. Russell Huff of Detroit, consulting engineer of Dodge Bros., was elected president of the society.

# Iron and Money: Fact and Comment

## Judge Gary's Warning Has Depressing Effect on Stocks—Remarkable Gains Made During Past Year

THE most interesting feature of the stock market last week was the decline in prices generally attributed to the words of warning against undue expansion and speculation issued by Judge Gary Thursday.

In the early part of the week, there was some weakness attributed to anxiety over the sinking of ships in the European war zone. This tendency was marked on Tuesday and a feverish feeling was noticeable on Wednesday. On Thursday, the influence of the Gary remarks was felt and a general decline was recorded. The action of the Steel Corporation in announcing a 10 per cent advance in wages did not seem to have much effect.

An upward tendency was manifested Friday and on Saturday the movement toward recovery continued in the half-day session.

Quotations at the close of business Jan. 8 and changes in the leading stocks identified with the iron and steel industry for the week are shown in the following table:

| | Close Jan. 8. | Net change. |
|---|---|---|
| American Can | 62⅝ | +6⅜ |
| American Can, prfd. | 112½ | + ½ |
| Amer. Car & Fdy. Co. | 71¼ | —7 |
| Amer. Car & Fdy. Co., prfd. | 118⅛ | + ⅛ |
| American Locomotive | 66¼ | —2¾ |
| American Locomotive, prfd. | 101 | +1¾ |
| American Steel Foundries | 59½ | —1½ |
| Baldwin Locomotive | 114½ | —3⅜ |
| Baldwin Locomotive, prfd. | 107½ | — ½ |
| Bethlehem Steel | 430 | —29½ |
| Bethlehem Steel, prfd. | 145 | ..... |
| Colorado Fuel & Iron | 51¼ | +2¼ |
| Continental Can | 84 | ..... |
| Continental Can, prfd. | 108 | +2¾ |
| Crucible Steel | 63½ | —3¼ |
| Crucible Steel, prfd. | 109¾ | —1¼ |
| General Electric | 173¾ | — ¾ |
| International Harv. of N. J. | 108⅞ | —1⅛ |
| Inter. Harv. of N. J., prfd. | 119½ | ..... |
| International Harv. Corp. | 78 | —2 |
| Lackawanna Steel | 85⅜ | +3¼ |
| Nat'l Enamel'g & Stamp. Co. | 28½ | — ½ |
| Nat'l En. & Stmp. Co., prfd. | 95 | ..... |
| Pressed Steel Car | 63½ | —1½ |
| Pressed Steel Car, prfd. | 104⅜ | — ⅝ |
| Pullman Palace Car | 165½ | + ½ |
| Republic Iron & Steel | 53 | —2½ |
| Republic Iron & Steel, prfd. | 109 | —1 |
| U. S. Cast Iron Pipe & Fdy. | 24 | —2 |
| U. S. C. I. P. & F., prfd. | 49⅛ | — ⅛ |
| United States Steel | 87½ | —1⅜ |
| United States Steel, prfd. | 117⅛ | + ⅝ |
| Westinghouse Mfg. | 68⅛ | —1⅝ |

## Gains of the Year

Last year was a period of wonderful activity in stocks closely connected with the manufacture of iron and steel. The greatest net gain was made by Bethlehem Steel, it being 413⅜ points, and other stocks advanced as never before in their history, but substantial advances were also recorded by United States Steel, Republic and other prominent stocks, as shown in the following table:

| | High. | Low. | Year's net change. |
|---|---|---|---|
| American Can | 68½ | 25 | +36⅛ |
| American Can, prfd. | 113½ | 91½ | +22½ |
| Amer. Car & Fdy. Co. | 98 | 40 | +33¾ |
| Amer. Car & Fdy. Co., prfd. | 118 | 111½ | +5 |
| Amer. Locomotive | 74¾ | 19 | +46⅜ |
| Amer. Locomo., prfd. | 105 | 75 | + 4⅜ |
| Amer. Steel Foundries | 74½ | 24⅛ | +33½ |
| Baldwin Locomotive | 154½ | 26⅝ | +77⅜ |
| Baldwin Locomo., prf. | 114 | 92 | + 5¼ |
| Bethlehem Steel | 600 | 46¼ | +413⅜ |
| Bethlehem Steel, prfd. | 184 | 91 | +53¾ |
| Colo. Fuel & Iron | 66½ | 21¾ | +30 |
| Continental Can | 127 | 40¼ | +42 |
| Continental Can, prfd. | 109½ | 88½ | +19 |
| Crucible Steel | 109⅞ | 18¼ | ..... |
| Crucible Steel, prfd. | 112½ | 84 | ..... |
| General Electric | 185½ | 138 | +35½ |
| Inter. Harv. of N. J. | 114 | 90 | +21⅞ |
| In. Harv. of N. J., pr. | 120 | 109⅜ | + 1⅜ |
| Inter. Harv. Corp. | 85 | 55 | —2 |
| In. Harv. Corp., prfd. | 114 | 90½ | —9 |
| Lackawanna Steel | 94¾ | 28 | +33 |
| Nat'l En. & Stmp. Co. | 36⅛ | 9½ | +19¼ |
| Nat'l En & Stmp. Co., prfd. | 97 | 79 | +15½ |
| Pressed Steel Car | 78¼ | 25 | +30⅜ |
| Pressed Steel Car, prf. | 106 | 86 | +5 |
| Pullman Palace Car | 170¼ | 150⅛ | +48 |
| Republic Iron & Steel | 57¼ | 19 | +37 |
| Republic I. & S., prfd. | 112⅝ | 72 | +35 |
| U. S. Cast Iron Pipe & Fdy. | 31⅞ | 8 | +18 |
| U. S. Cast Iron Pipe & Fdy., prfd. | 55½ | 32½ | +19¼ |
| United States Steel | 89¾ | 38 | +39½ |
| U. S. Steel, prfd. | 117 | 102 | +12½ |
| Westinghouse Mfg. | 74⅞ | 62 | +35¾ |

## Formally Approved

At a meeting of the stockholders of the Thomas Iron Co. at Easton, Pa., Dec. 30, formal ratification was given for the sale of the company's properties under the option recently given to a syndicate which also has optioned the Empire Steel & Iron Co. and the Wharton Steel Co.

## Collecting Shares

Toledo, Jan. 11.—Representatives of Hoyt & McWilliams, New York brokers, are busily at work in Toledo, gathering in scattering shares of the Toledo Machine & Tool Co., which have not yet been deposited in the National Bank of Commerce, as requested some weeks ago. These activities are being made as the forerunner of the sale of the property to eastern brokers, but even the stockholders are in the dark as to the actual new owners, although it is rumored that J. P. Morgan is back of the projected purchase. It is stated that most of the stock deposited will bring $325 per share and there are 12,000 shares. The present capitalization of the company is $1,500,000. If the projected purchase is carried out—and it is expected that it will be within a very short time now—the plant will be operated by a $6,000,000 corporation. The Toledo Machine & Tool Co. was organized 25 years ago with an authorized capital of $30,000. It has been paying a monthly dividend ranging from 1½ to 3 per cent. The monthly dividends have recently been averaging 2 per cent because of $100,000 worth of improvement now under way at the plant.

## Stock for Employes

Employes of the United States Steel Corporation this year will pay 85 for their subscriptions to the common stock, which is the highest price ever established by the finance committee in offering this class of shares. The Steel Corporation, this year, as recently stated, has set aside 35,000 shares of common stock for its employes and subscriptions are to be received around Feb. 1. Last year, no stock offers were made. Two years ago, the common was offered at 57 and the preferred at 105. In that year, the subscriptions were 47,680 shares of common and 42,926 preferred. In December, 1912, 25,793 shares of common at 66 and 34,551 of preferred at 109 were taken; in 1911, 30,735 shares of common at 65 and 30,619 of preferred at 110; in 1910, 29,119 shares of common at 70 and 19,229 of preferred at 114. In 1909, no common was offered and the preferred was fixed at 124. In 1908, the common was 50 and the preferred 110. Subscriptions were 15,318 common and 18,000 preferred. Prior to that time, only preferred was offered, the prices being 87½ in 1907; 102 in 1906; 100 in 1905; 87½ in 1904; 55 in 1903, and 82½ in 1902.

## Cleveland-Cliffs Dividend

Directors of the Cleveland-Cliffs Iron Co., Cleveland, have declared a stock dividend of 50 per cent in addition to the regular cash dividend of 2½ per cent. An official circular, received by stockholders yesterday, says:

"At a meeting of the directors of the company held today a cash dividend of 2½ per cent was declared, payable Jan. 25, to stockholders of record Jan. 15, 1916. The books of the company will close at the close of business on Jan. 15 for the purpose of this dividend, and will be reopened at the opening of business on Jan. 26.

"In addition to the cash dividend above mentioned the directors declared a stock dividend of 50 per cent, also payable on Jan. 25 to stockholders of record Jan. 15. The cash dividend is payable on the stock now outstanding, the increased stock not participating in this cash dividend."

The letter also asks shareholders, in view of the recent enlargement of authorized capital from $5,000,000 to $10,000,000, to turn in their old stock for exchange into new certificates.

## Funds for Extension

The National-Acme Mfg. Co., Cleveland, has acquired the plant of the Windsor Machine Co., of Windsor, Vt. The present intention is to continue at all three plants—Cleveland, Montreal and Windsor—along the lines heretofore followed, with the view of expanding each and all as rapidly as conditions will seemingly warrant.

For the purpose of providing funds for an extension at Cleveland about completed, for contemplated improvements at Montreal, and to provide in part for the purchase of the Windsor property, it is proposed to increase the capital stock of the company at a special stockholders' meeting called concurrently with the regular annual meeting to be held Jan 20.

## Financial Notes

The United States District Court at Trenton has ordered Harold B. Wells, receiver of the Florence Iron Co., Florence, N. J., to sell the plant. The receiver has been operating the company at a small profit since he took charge several months ago. The court also directed the receiver of the Camden Iron Works, Camden, N. J., to continue the business.

The Allen Motor Co., Fostoria, O., has increased its capital stock from $400,000 to $1,500,000. The company has not yet made public announcement of what its plans will be, but expansion of the concern is undoubtedly the object of the increased capitalization.

## All-Steel Cars

Toledo, Jan. 11.—The Lake Shore Electric has installed its first steel cars, displacing the wooden coaches. Three new cars were put on the road a few days ago and are the first all-steel cars to be used on this road. These will be used on the limited trains and will probably presage the purchase of others later on. The Lake Shore Electric is taking a forward step in the placing of this safe equipment on its road, as very few electric lines have as yet recognized the necessity for using the all-steel cars.

## Effect of Vibration

Recognizing that higher speed, better work and greater human efficiency are possible in a stable as compared with a vibrating structure, the Aberthaw Construction Co., Boston, is undertaking an exhaustive investigation in an effort to bring together conclusive evidence bearing on this subject. It is realized that exact data, proving this fact, are difficult to obtain, and, therefore, the Aberthaw company will appreciate suggestions or reports of experiences that others may have had along this line. These may have to do with any aspect of the case that will assist in the collection of facts or the reaching of conclusions.

## Limestone Production Declines

The marketed production of limestone decreased in value from $38,745,429 in 1913 to $33,894,155 in 1914, a decline of $4,851,274, or 12.52 per cent. This was the largest proportionate decrease in all kinds of stone, except that in basalt and related rocks, and was by far the largest decrease in actual value. Compared with the production in years prior to 1913, it was the smallest in value since that of 1909, though only slightly less than that of 1911. The great decrease in limestone was caused by the depressed condition in 1914 of nearly all the industries in which it was used. The most extreme case is shown by furnace flux, which decreased $3,213,620 in value. The next largest decrease was in the value of railroad ballast, which declined $1,584,067.

## Machinery for China

Washington, Jan. 10.—The Chinese government has decided to equip two cotton mills with American machinery and has placed orders with American manufacturers and builders for machinery and plants valued at more than $700,000. The action of the government is particularly gratifying to American manufacturers of textile machinery and power equipment because it was taken after a careful consideration of the claims of rival concerns in European countries, and because it means a royal entrance to a market that will be inviting for many years to come.

The negotiations between the Chinese government and the American concerns were conducted with the assistance of Commercial Attache Julean H. Arnold, who was the first to call the opportunity to the attention of American manufacturers. Mr. Arnold represents the United States Bureau of Foreign and Domestic Commerce in China.

## Distributes Stock

On Tuesday evening, Dec. 28, the Federal Foundry Supply Co., Cleveland, entertained its sales force at a banquet at the Cleveland Athletic Club. Walter J. Adams, president, and Ralph Ditty, secretary and treasurer of the company, delivered addresses which were responded to by each one of the salesmen. In appreciation of the services of the good work of the sales force during the past year, each representative was presented with five shares of stock and it is stated that it is the intention to continue this practice while business continues prosperous and until each representative has a reasonable interest in the company. Announcement also was made that R. A. Smith has been appointed New England representative of the Federal Foundry Supply Co., with headquarters at Boston, and I. D. Adams has been appointed New York state representative with Syracuse as headquarters.

## Tin Smelting in America

Washington, Jan. 10.—*Commerce Reports* announces the establishment of an entirely new industry in the United States. All arrangements have been completed for the importation of Bolivian tin ore by the American Smelting & Refining Co., and a large plant has been erected at Perth Amboy, N. J., for smelting and refining the raw material. It will be the first attempt to establish the industry on a large scale in the United States.

The first definite information that such an undertaking had been decided upon was contained in a letter to Secretary Redfield from William Loeb Jr., of the American Smelting & Reining Co., in which it was stated that a new plant had been practically completed at Perth Amboy for the smelting of tin ores and concentrates and the electrolytic refining of tin. Mr. Loeb stated that this country imports about 45,000 tons of tin yearly.

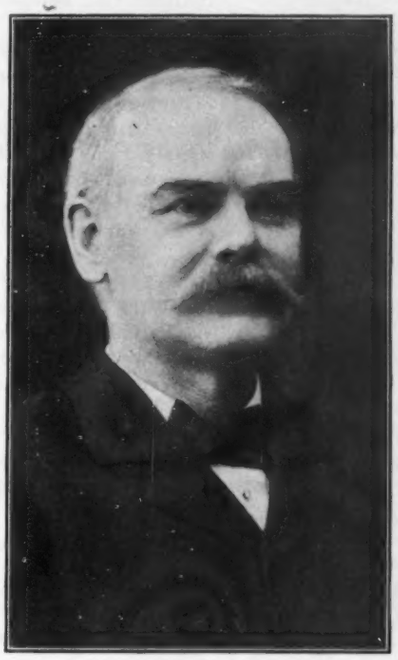
The International Oxygen Co. announces that, effective Jan. 1, 1916, it has inaugurated the 8-hour day at its works, Newark, N. J."

# MEN OF THE IRON TRADE

**Who they are** **Where they are** **What they are doing**

James H. Grose, as stated in *The Iron Trade Review* of Jan. 6, succeeded Thos. McDonald, general superintendent of the Youngstown, O., district for the Carnegie Steel Co. Mr. Grose was born at Calumet, Mich., but with his parents located at Youngstown when a lad. He was employed there at the Morse Bridge Works, later going to the Homestead plant of the Carnegie Steel Co.; in 1909, superintendent of the Howard Axle Works; then general superintendent of the Schoen wheel works; and four years ago going to Youngstown as superintendent of the Ohio Works. Thomas McDonald, who has reached his 68th year, inaugurated steel-making in the Mahoning valley, becoming general manager of the New Ohio works 22 years ago after an active career at the Duquesne works. He entered the employ of the Carnegie Steel Co. at Braddock in 1875 as a carpenter, but four years later he became a turn foreman in the bessemer department. He will be retained as advisory manager.

I. Lamont Hughes becomes assistant district superintendent of the Carnegie company at Youngstown. Mr. Hughes began steel-making at the Edgar Thomson works, later assisting in the construction of the Donora works. He afterwards was employed as engineer at the Union mills at Youngstown; in 1906 became assistant general superintendent, and



THOMAS McDONALD,
Former General Superintendent, Youngstown District, Carnegie Steel Co.

J. H. GROSE,
General Superintendent, Youngstown District, Carnegie Steel Co.

in 1911 became general superintendent of bar mills.

A. W. Griffith, who has been assistant to I. Lamont Hughes, at the upper and lower mills of the Carnegie Steel Co., at Youngstown, has been promoted to superintendent of bar mills in the Youngstown district. Harry Baugh is promoted from superintendent of the upper mill to assistant general superintendent of bar mills. Powers Wick is promoted from superintendent at the lower mill to the position vacated by Mr. Baugh. W. V. Williams, night superintendent at the lower mills, becomes day superintendent.

Theodore Marburg, of Marburg Bros., New York, importers of magnetos, ball bearings, etc., has returned from a trip to Europe.

Walter Haynie, of the Bolinders Co., 30 Church street, New York, has returned from a visit to the home office and plant of this concern at Stockholm, Sweden.

Harold M. Scott has been appointed assistant secretary of the Lehigh Portland Cement Co., with headquarters at Chicago. B. H. Rader has been made western sales manager, at the Chicago office.

L. J. Hotchkiss, for 11 years with the Chicago, Burlington & Quincy railroad, and for two years with the Bates & Rogers Construction Co., has opened offices as consulting engineer in the Monadnock building, Chicago.

William J. Priestly, superintendent of the armor plate department of the Bethlehem Steel Co., has been promoted to be superintendent of Nos. 1, 2 and 4 machine shops, to succeed the late John M. Herbig.

E. F. Carry, first vice president of the American Car & Foundry Co., has resigned to become president of the Haskell & Barker Car Co. at Michigan City, Ind., which recently was acquired by a syndicate of New York bankers and capitalists.

Elisha H. Cooper has resigned as secretary of the Fafnir Bearing Co., New Britain, Ct., but will continue as treasurer. Maurice Stanley has been chosen secretary to succeed him and Alfred G. Way has been made assistant treasurer.

Francis A. Erickson, for 16½ years connected with the Morgan Spring Co., and previous to that for 17 years

I. LAMONT HUGHES,
Assistant General Superintendent, Youngstown District, Carnegie Steel Co.

with the Worcester Wire Co., has resigned and accepted a position with the Indiana Steel & Wire Co., Muncie, Ind.

Samuel Stoneham has resigned as superintendent of the Michigan Steel Casting Co., Detroit, and all communications should be addressed to 116 Hendrie avenue, Detroit.

E. Bruce Dunn, for the past 15 years secretary of the Spencer Wire Co., Worcester, Mass., has resigned and removed to Los Angeles, Cal., where he will engage in business as a manufacturers' agent.

G. L. Tinkham, of the Allied Contracting Co., sailed for Russia on Jan. 8, where he will act as representative of various American manufacturers in developing trade. Mr. Tinkham's headquarters will be at Petrograd.

H. C. Beckwith, Chicago manager for T. L. Smith Co., of Milwaukee, went to Ravenna, O., Jan. 1, to become treasurer and general manager of the Byers Machine Co., manufacturer of hoisting and excavating machinery.

Charles H. Kelly has tendered his resignation as general manager of the Muncie Oil Engine Co., Muncie, Ind., to accept the position of sales manager of the Power Mfg. Co., Lima, O. Mr. Kelly was connected with the Muncie Oil Engine Co. for five years.

Robert C. Barton, of Chicago, has been appointed district manager for the Western Reserve Steel Co., Warren, O., and assumed his new duties Jan. 1 at 1631 Lytton building, Chicago. He succeeds G. E. Studebaker, who has been promoted to a place in the home office at Warren.

B. F. Affleck, Chicago, president of the Universal Portland Cement Co., has been elected president of the Association of American Portland Cement Manufacturers, succeeding John B. Lober, president of the Vulcanite Portland Cement Co., of Philadelphia.

Arthur E. Newbold, Philadelphia, has been elected chairman of the executive committee of the Cambria Steel Co., vice E. B. Morris, resigned. E. V. Babcock, of Pittsburgh, has been made a director in Mr. Morris' place. Powell Stackhouse was placed on the executive committee.

A. F. Stirling Blackwood has resigned as vice president and manager of the Michigan Steel Casting Co., Detroit. Under his management this company grew from a small crucible foundry to be one of the most important of the smaller steel casting companies in the United States.

Andrew Carnegie has leased the "Brick House" estate of the late Anson Phelps Stokes, in Noroton, Ct., five miles from Stamford, where he has arranged to spend next summer. The Stokes estate comprises 10½ acres on the extreme end of Long Neck Point, jutting into Long Island Sound.

Arthur H. Chamberlain has been appointed secretary-treasurer of the American Iron, Steel and Heavy Hardware Association. He was for several years on the editorial staff of the *Iron Age* and for the last three years has been connected with the hardware department of Wiebusch & Hilger Ltd., New York City.

Collingwood Schreiber, consulting engineer to the Canadian government since 1905, and previously chief engineer of the department of railways and canals and deputy minister of that department, has received from King George the title of Knight Commander of the Order of St. Michael and St. George.

L. F. Nagle, for 18 years general manager of sales of the Worth Bros. Co., Coatesville, Pa., has resigned. President A. C. Dinkey, of the Midvale Steel Co., recently announced the appointment of John C. Neale as general sales manager of that company with jurisdiction over the sales of the Worth Bros. Co. Mr. Nagle has made no announcement of his future plans.

Harry Eugene Kelly, formerly of the Denver bar and sometime United States attorney for Colorado, has resigned as attorney for the interstate commerce commission to become a member of the firm of Cassidy, Butler, Lamb & Foster, lawyers, of Chicago, and will devote his time largely to cases arising out of the anti-trust laws and the acts to regulate commerce.

George E. Hodson, president and treasurer of the Winchester Repeating Arms Co., New Haven, Ct., has resigned by reason of continued ill health and will be succeeded by Winchester Bennett, first vice president. Mr. Hodson entered the plant 44 years ago as an office boy, and was elected president and treasurer in February, 1911. His health has suffered by reason of excessive strain put upon him through enlargement of the plant and increase in business during recent months.

E. F. Walker, formerly manager of the waterworks department of the International Steam Pump Co., and until recently eastern representative of John H. McGowan Co., has connected himself with the National Transit Pump & Machine Co., of Oil City, Pa., as its representative in eastern New York, New Jersey and the New England States, with headquarters at 30 Church street, New York. The National Transit Pump & Machine Co. was a former subsidiary of the Standard Oil Co. and is well known as a builder of oil pumping machinery.

A. S. Baldwin has resigned as works manager of the R. D. Nuttall Co., Pittsburgh, to accept a position as manager of ordnance of the Poole Engineering & Machine Co., Baltimore, which now is filling contracts approximating $19,000,000 for foreign governments. Prior to his connection with the R. D. Nuttall Co., Mr. Baldwin was affiliated, in the capacity of general manager, with the Alberger Pump & Condenser Co., Newburg, N. Y., for a period of three years, was general superintendent of the Driggs-Seabury Ordnance Corporation, Sharon, Pa., for four and a half years, and for two years was superintendent of the American-British Mfg. Co., Bridgeport, Conn.

Edward R. Stettinius, who for several months past has supervised the purchase of supplies for the British government through J. P. Morgan & Co., has been admitted to membership in the latter firm effective Jan. 1. Mr. Stettinius has had a wide experience in the development of industrial enterprises. As a young man, he became identified with the Sterling Co., manufacturer of boilers, which was succeeded by the Babcock & Wilcox Co., and he was active in the reorganization of the latter. Mr. Stettinius subsequently performed similar work for the Diamond Match Co. He is a director of numerous industrial, public utility and banking corporations.

Henry Wilson Hodge, who has been appointed member of the public service commission at New York City, has had a notable career as a bridge engineer. After graduating from Rensselaer Polytechnic Institute in 1885, he became one of the assistant engineers of the Phoenix Bridge Co., at Phoenixville, Pa., remaining until 1891, when he became chief engineer of the Union Iron Works, New York City, engaged in steel building work. He resigned in 1893 and took up independent practice, becoming, in 1898, a partner of the firm of Boller & Hodge, New York City. At the present time, the style of the firm is Boller, Hodge & Baird, with offices at 149 Broadway. Mr. Hodge has served as the engineer for some of the largest bridges and buildings in the country.

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**The blast furnace of the Berkshire Iron Co. at Sheridan, Pa., is being placed in readiness for early resumption. The plant has been idle for more than a year.**

## Hundred Years of Business

The year 1916 marks one century in business for the Peter A. Frasse & Co., Inc., New York. Some of our old ledgers which are still in existence show transactions with Aaron Burr, Alexander Hamilton and many of the other well known earlier men of Manhattan. In the little shop of the original Frasse was made the model engine for the model steamboat invented by Robert Fulton. This company has recently purchased a tract of land, 65 x 344 feet, close by the tracks of the Central New England railway, in Hartford, Conn., on which a new mill and warehouse will be erected. The building will be three stories of either mill or concrete construction. In the heat treating department, furnaces for annealing, heat treating, case hardening and tempering of steels will be provided. Draw benches for cold drawing will be installed, and lathes for machining steel bars.

## New England Foundrymen

W. B. Leach of the Hunt-Spiller Mfg. Corporation, Boston, was elected president of the New England Foundrymen's Association, at the annual meeting held at the Exchange Club, Boston, Mass., Wednesday evening, Jan. 12. This occasion marked the 20th anniversary of the formation of the association. The other officers elected were as follows: Vice president, Stephen E. French, Athol Machine Co., Athol, Mass.; secretary, Fred F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass. Executive committee: Chas. A. Reed, Reed, Fears & Miller, Boston, Mass.; T. R. Scott, Browne & Sharpe Mfg. Co., Providence, R. I.; H. Paul Buckingham, Arcade Malleable Iron Co., Worcester, Mass.; L. J. Harley, Jr., Harley Co., Springfield, Mass., and Chas. L. Taylor, Taylor & Fenn Co., Hartford, Conn. A dinner was served at which Chas. L. Newcomb of Holyoke, officiated as toastmaster. There were speeches by prominent public men, music and other entertainment.

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Central Iron Works, Des Moines Ia., has changed its name to Central Wire & Iron Works.

## Accidents That Make the Heart Sick

### (Seventh of a Series of Short Stories on Iron)

By P. B. McDONALD, Mining Engineer

*At a certain mine in the Iron River district, the "pumpman" and three other men were sitting in the warm pump-room several hundred feet underground one night—the pump-room frequently being the only dry place in the more or less "dripping" iron mines—when the rock under their feet suddenly gave way, the huge steam-pump collapsed, and the steam line from the shaft broke, blowing hot, scalding steam into the confused mass of rock, machinery and men. It is such a catastrophe as this that takes the heart out of a superintendent, when he sees his men killed and the work of months reduced to nothing by a sudden accident which may or may not be due to somebody's negligence.*

*A mine superintendent must literally*

*"Watch the things he gave his life to, broken,*
*And stoop and build 'em up with worn-out tools".*

*and not infrequently he must learn to*

*"Make one heap of all his winnings*
*And risk it on one turn of pitch-and-toss,*
*And lose, and start again at the beginning*
*And never breathe a word about the loss".*

*For sometimes in the exploration work necessary to find ore before it can be mined, things look very dubious and very dark. And in the development of a mine, when a shaft in quicksand persists in caving and buckling or twisting out of all recognition, or when something gives way and men are dashed to death, or when water floods the mine, or the roof drops in, the superintendent must be the man who never loses his head, never gives up, and he must at times furnish optimism for the entire force of men. For, like Arctic exploring, mining is a game where optimism is one of the most essential of the human qualities to keep men at work and to "buck one's way through."*

## Philadelphia Foundrymen Elect

Thomas Devlin, of the Thomas Devlin Mfg. Co., Philadelphia, was elected president of the Philadelphia Foundrymen's Association at its annual meeting at the Manufacturers' Club, in that city on Jan. 5. The other officers re-elected were: A. A. Miller, vice president; Josiah Thompson, J. Thompson & Co., treasurer; Howard Evans, J. W. Paxson Co., secretary; Walter Wood, R. D. Wood & Co.; Thomas M. Eynon, the Eynon-Evans Mfg. Co.; H. L. Haldeman, Pulaski Iron Co.; Walter T. Macdonald, Schaum & Uhlinger Co., all of Philadelphia, and Walter S. Bickley, Penn Steel Casting Machine Co., of Chester, Pa., executive committee; Messrs. Devlin, Thompson and Evans, trustees; and George C. Davis, Philadelphia, official chemist.

Albert L. Allen, assistant manager of the state workmen's insurance fund of Pennsylvania, addressed the association and explained the features of the workmen's compensation act with particular reference to the insurance provision.

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## Furnace Property Transferred

As a further step in the development of a new steel works proposition in the east, negotiations have been closed whereby the Temple, Pa., blast furnace of the Temple Iron Co., recently acquired by H. H. Adams, of New York City, and associates, has been transferred to the Delaware Steel & Ordnance Co., the $10,000,000 corporation, which has been formed to operate the old works of the Diamond State Steel Co., at Wilmington, Del. This furnace, which was blown in about 30 days ago, will supply a portion of the pig iron requirements of the Wilmington steel works. Present plans provide for other blast furnace capacity for the steel plant. Albert Broden, who recently resigned as general superintendent of blast furnaces of the Reading Iron Co., to be associated with Mr. Adams in purchasing the Temple furnace, has become a director of the Delaware Steel & Ordnance Co. and will be manager of the Temple furnace and other furnace properties which the company may acquire later.

# Big Russian Buying Boosts Market

## Domestic Inquiry is Close Second—Pittsburgh Mills Buy Heavily—Chicago and Cincinnati Markets Are Quiet—Canadian Demand Good

A STEADY and active demand for machine tools of all kinds characterizes the opening of the new year. With the exception of heavy buying on the part of Russia, however, the demand is chiefly from domestic sources and comes in a scattered way from practically all lines of industry. In other words, with the exception of the heavy Russian buying, the direct demand for machine tools for making war munitions does not figure to a very notable extent.

The indications are that such direct buying for war purposes no longer will figure so actively in the future as during most of 1915, since munition makers in this country and in the belligerent countries are practically equipped. Machine tool makers are booked so far ahead that it is exceedingly difficult to place large lots of machine tools for reasonable delivery. Some of the makers who are sold ahead have withdrawn prices and practically refuse to quote. For instance, one large manufacturer of milling machines now advises it cannot accept orders for delivery sooner than 15 months, and it will quote no prices. This is due to the advancing prices on all kinds of materials, making it impossible for the machine tool makers to estimate the cost of their product for any great length of time ahead.

Among the heavy buyers of machine tools at present are the railroads, which are entering the market constantly for scattered requirements. Among railroad buyers in the east during the past week were the Delaware, Lackawanna & Western and the Lehigh Valley. The Pennsylvania railroad is working on a list of machine tool specifications which it will submit for bids shortly. Practically all of the ship building companies on the eastern seaboard continue to be active purchasers. Incuded among these is the Newport News Ship Building & Dry Dock Co., which placed good-sized orders and continues in the market. Large machinery houses say the reports from their branches show that domestic demand is good all over the country.

Among eastern concerns which are expanding their capacity are the Ward Leonard Electric Co., Bronxville, N. Y.; Tioga Machine Co., Philadelphia; Cannister Co., Phillipsburg, N. J.; Campbell Electric Co., Lynn, Mass.; Marlin Fire Arms Corporation, New Haven, Ct.; Victor Talking Machine Co., Camden, N. J.; Stafford Iron Works, Worcester, Mass.; Zeh & Hahneman, Newark, N. J.; Simplex Motor Co., New Brunswick, N. J.; Henry Disston & Sons, Inc., Philadelphia; Abrasive Material Co., Philadelphia; Rockwell-Drake Co., Plainville, Ct.; C. Pardee Works, Perth Amboy, N. J.; Excelsior Needle Co., Torrington, Ct., which has purchased a plant at Chicopee, Mass.; United Injector Co., Boston; Hartshorn Shade Roller Co., Harrison, N. J., which is equipping a machine shop at Millburn, N. J.; Dynetto Electric Co., Syracuse, N. Y., and Thurlow Steel Co., Thurlow, Pa.

### *Chicago Market Slack*

A number of factors seem to be acting to bring about a decided lull in trading among machine tool dealers. Embargoes by eastern railroads on shipments for export, which remain in force on all roads except the Michigan Central, have a depressing effect. The usual holiday quiet seems to have passed over into the early part of January as well. One considerable cancellation has been made in this market and it has affected a number of dealers who had sold second hand machinery for export to England to a buyer who has not been able to obtain a license. These machines were boxed for export shipment and are now left on the hands of dealers. It is believed the ultimate effect will not be noticeable as machines thus released will be taken up by domestic buyers who desire that class of equipment.

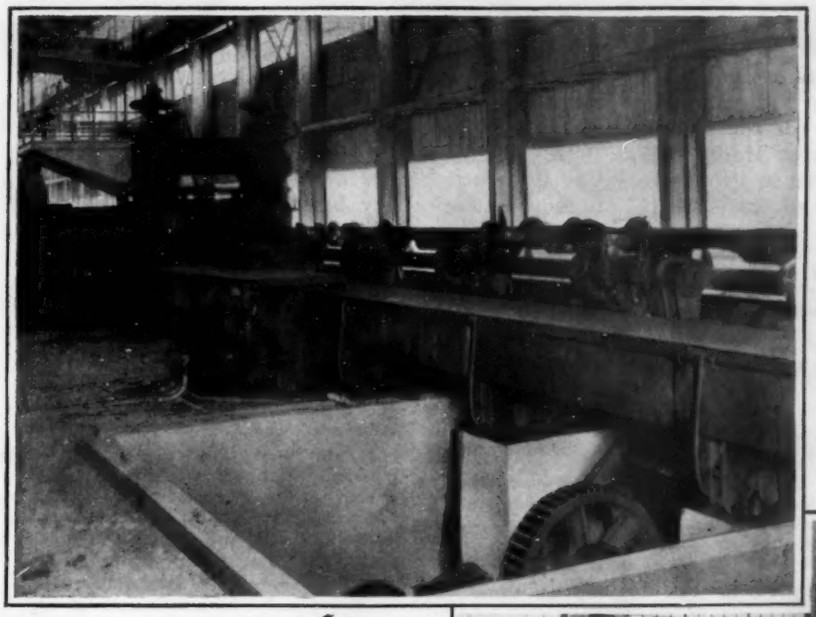
Activity of steel companies in building is expected to bring out considerable inquiry during the first half of the present year. The Inland Steel Co. already has put out a list and the Illinois Steel Co. is preparing one which will be issued in a short time and is expected to call for considerable equipment. The Southern railroad is in the market for machine tools which will be bought through its Washington office. Automobile manufacturers are particularly busy in adding machinery.

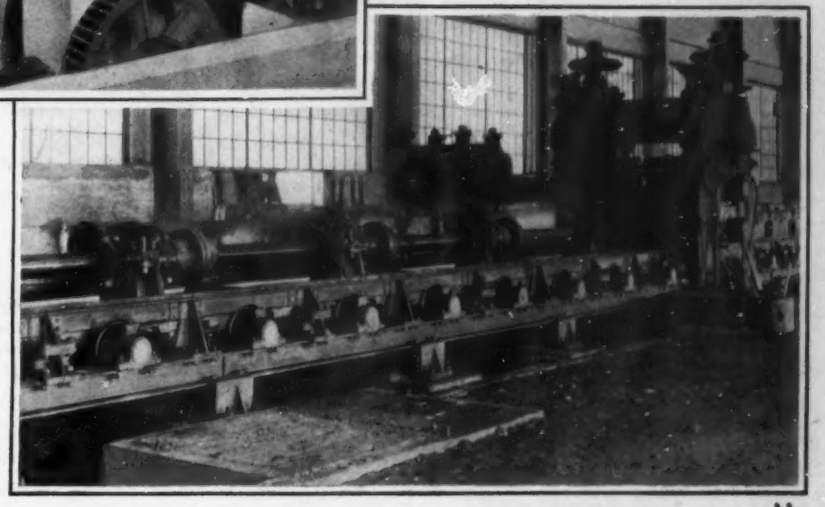
### *Steel Plants Buy Equipment*

Buying of machinery is heavy at Pittsburgh. Several manufacturing concerns soon will ask estimates on attractive lists of miscellaneous types of machine tools, and a number of steel producers are figuring on additional rolling mill equipment. The Phillips Sheet & Tin Plate Co., Weirton, W. Va., which is doubling the capacity of its strip steel mill, has been buying considerable equipment for the manufacture of hoops and bands. The new mills will be motor-driven. Contracts for two 3,000-kilowatt turbo-generators; one 1,500-horsepower constant speed motor; one 2,500-horespower and one 800-horsepower adjustable speed motor, together with auxiliary equipment, have been placed with the Westinghouse Electric & Mfg. Co., East Pittsburgh. The Westinghouse company also has taken orders for two 5,000-kilowatt steam turbines and two 8,000-horsepower motors for installation in the plant of the Inland Steel Co., Indiana Harbor, Ind. The Brier Hill Steel Co. has placed contracts with the H. Koppers Co. for 84 by-product coke ovens and will buy necessary coal handling equipment.

### *Cleveland Market Steady*

The tool market in Cleveland is strong but the demand from abroad, that existed during the last few months of last year, is lacking. There is a good inquiry from Canadian sources, but due to the time clause in delivery, not much business is being taken. A good demand exists for second hand tools, but few machines of this kind are to be secured. A Cleveland dealer reports that at almost any time an increase in price for new tools is expected. One eastern builder has already announced a revised price list for Jan. 1, and it is thought that other builders will soon issue similar lists. Domestic users are keeping the





**ACCURACY OF FINISH ASSURED**

Our electrically driven Bar Mill with its three high stands and automatic tilting tables is designed not only for large production, but also to roll your steel ***accurately*** to size. ***Agathon quality demands accurate rolling.***

The illustrations show our Bar Mill Stand No. 1.

We are proud of every detail of our remarkable plant—and we would like to take you through it personally. Will you come?

# AGATHON STEELS

**WILL SERVE YOUR PURPOSES *BEST!***

WE MAKE

| | |
|---|---|
| "AGATHON" Chrome Nickel | "AGATHON" Vanadium |
| "AGATHON" Chrome Vanadium | "AGATHON" Silico-Manganese |
| "AGATHON" Nickel Steels | "AGATHON" Chrome Steel |
| "AGATHON" Special Analyses | "AGATHON" High Carbon |

## THE CENTRAL STEEL COMPANY

**MASSILLON, OHIO**

**Detroit Office: 326-27-28 Ford Bldg.** **F. Walter Guibert, District Representative**
**Cleveland Office: Hickox Bldg.** **The Hamill-Hickox Co., District Representative**

AGATHON STEELS

market alive, and the demands of these consumers remains unsatisfied. Second hand tools are being bought by long distance telephone from the Pacific coast in the endeavor to fill urgent orders. The dealers are optimistic over prospects for the coming year. Deliveries on some tools are set at March 1917 and on tools in less active demand, seven to 10 months delivery is quoted. In a number of cases 1916 delivery is impossible.

*Cincinnati Market Dull*

The machine tool market in Cincinnati is not as promising as at the beginning of 1915. Demand is slackening and a strike of union machinists during the last quarter of last year, and which is extending into this year, is handicapping several machine tool plants. All of the large machine tool shops have orders extending into the second half of the year, and some have a sufficient number to run them at full capacity until 1917. The new plant of the American Tool Works Co., the erection of which will be begun at once, will occupy an entire city block, and will be one of the largest in the middle west. It will be located at Pearl and Eggleston avenues. The strike situation at Hamilton, O., is growing more serious. Very few machine tool plants in that city are operating at 50 per cent or over, and in some cases have been closed down entirely.

## EASTERN STATES

BALTIMORE.—Wise Bros., 132 West Fayette street, are having plans prepared for a 6-story, 46 x 182-foot factory.

ARLINGTON, N. J.—The E. I. du Pont de Nemours Powder Co. has secured an option on the plant and good will of the Arlington Co., makers of pyralin.

BLOOMFIELD, N. J.—The Peerless Tube Co. has contracted with the Salmond Bros. Co. for the erection of an addition, to cost $13,100.

CAMDEN, N. J.—The Victor Talking Machine Co. is having plans prepared for a 4-story addition, 91 x 274 feet, and a 6-story addition, 76 x 233 feet.

ELIZABETH, N. J.—The Schwab interests have let a contract with Levering & Garrigues Co., New York, for the erection of a plant for the Samuel L. Moore & Sons Corporation. The structure will cost $160,000.

JERSEY CITY, N. J.—The board of estimate has planned the erection of new schools to cost $3,000,000, including two high schools.

JERSEY CITY, N. J.—The Lehigh Valley railroad will build a steel pier 580 feet long and 67 feet wide at its Hudson River terminal.

MILLBURN, N. J.—Stewart Hartshorn, owner of a spring shade roller concern in Newark, will build a big machine plant in Millburn and remove the former works.

MILLVILLE, N. J.—International Glass Co. is having plans drawn for the erection of a plant at Millville.

MONTCLAIR, N. J.—Seaboard Foundry & Machine Co. has been incorporated to conduct a foundry works; $75,000 capital stock; by H. J. Redfield, Montclair; Jessie Rowland, William E. White, Brooklyn.

NEWARK, N. J.—The Splitdorf Electric Co. has postponed indefinitely its plans for building a 5-story addition to its magneto factory.

NEWARK, N. J.—The Zeh & Hahneman Co., Avenue A and Vanderpool street, has let a contract for the erection of a 42 x 50-foot, 1-story brick addition.

NEW BRUNSWICK, N. J.—The Simplex Motor Co. has let a contract for two factory additions.

OUTCALT, N. J.—The plant of the Lake Ruth Mfg. Co., manufacturer of rubber goods, was damaged by fire, causing a loss of $20,000.

PLAINFIELD, N. J.—The Vitaphone Co. is about to start work on a brass foundry at Netherwood.

PERTH AMBOY, N. J.—C. Pardee Works has been granted a permit to erect a 1-story addition.

PERTH AMBOY, N. J.—The United Lead Co. has been granted a permit to erect a 1-story carpenter shop.

PHILLIPSBURG, N. J.—The Cannister Co. has let a contract for a 2-story, 80 x 159 and 34 x 70-foot plant, to be devoted to the manufacture of munitions.

RIVERSIDE, N. J.—The 5-story plant of the William F. Taubel, Inc., hosiery manufacturers, was damaged by fire, causing a loss of $200,000. President William F. Taubel says the plant will be rebuilt at once.

SUSSEX, N. J.—The Lehigh Valley railroad has purchased six locomotive cranes to be used in laying rails for new tracks.

TRENTON, N. J.—The Trenton Laundry Co. will erect a plant 50 x 200 feet.

TRENTON, N. J.—The Hudson Automobile Co. will erect a new storehouse and garage here, 62 x 87, two stories.

WEEHAWKEN, N. J.—The Weehawken Tungsten Lamp Co. has been incorporated to manufacture tungsten lamps; $10,000 capital; by Selma Puskas, Joseph F. Kelberger, Joseph Force, New York.

DUBOIS, PA.—The Dubois Clay Mfg. Co., capital stock $16,000, incorporated by S. J. Schrecongust, A. S. Moulthrop and H. E. Boner.

FRANKLIN, PA.—The Colburn Machine Tool Co. has postponed until next spring the erection of a 1-story, 20 x 100-foot factory addition.

GREENSBURG, PA.—The Barnes Safe & Lock Co. has been incorporated; $30,000 capital stock; by T. Barnes Newell, John H. Newell, Greensburg, F. B. Newell, Pittsburgh.

PHILADELPHIA.—The plant of John M. Melloy's Sons, manufacturers of tinware, was badly damaged by fire.

PHILADELPHIA.—The Tioga Machine Co., 2027 Estaugh street, has let a contract for a 1-story, 105 x 160-foot machine shop.

PHILADELPHIA.—The Atlantic Asbestos Co. has been incorporated; $10,000 capital stock; by C. Donald Swartz and others.

PHILADELPHIA.—The Peck Machine & Ordnance Co. has been incorporated; $5,000 capital stock; by James B. Wilson and others.

PHILADELPHIA.—The American Insulating Machinery Co. has been incorporated; $50,000 capital stock; by Henry L. Benner and others.

PHILADELPHIA.—The Pearl Shell Steamship Co. has been incorporated to engage in the construction of ships and boats of all kinds and the transportation of passengers and freight; $650,000 capital stock; by W. Meischke-Smith, J. C. Van Eck, John Lauder, H. R. Gallagher, R. A. Lewin, San Francisco, Cal.

PITTSBURGH.—The Pittsburgh Gear & Machine Co. has been incorporated; $20,000 capital stock; by Frank H. Rea, John J. Jackson and W. C. Rea, Pittsburgh.

PITTSBURGH.—The Hillman-Neff Coke Co. has been incorporated; $5,000 capital stock; by John C. Neff, J. H. Hillman Jr., Ernest Hillman, A. B. Sheets and R. W. Flenniken, Pittsburgh.

PITTSBURGH.—The Crucible Steel Co. of America, which abandoned plans to install stokers and make other improvements to its boilers in 1915, probably will undertake this work at an early date.

PITTSBURGH.—The Benzol Products Co. has been incorporated; $20,000 capital stock; by Harold P. Hobart, William C. Moore, H. V. Blaxter, Pittsburgh, R. L. Byers, Crafton, Pa., Benjamin M. Price, Sewickley, Pa.

PITTSBURGH.—The Specialties Co., capital stock $5,000, incorporated by W. F. Sanville, E. G. Seeman, Pittsburgh, and W. E. Ralston, Wilkinsburg. The company will manufacture railroad and building supplies.

PITTSBURGH.—The Carbon Creek Coal Co., capital stock $75,000, incorporated by M. W. Lowrey, Pittsburgh, and W. A. Thomas and William G. Pearson of Scranton, Pa. The company is permitted to acquire and develop coal and mineral lands.

READING, PA.—The factory department of the American Iron & Steel Co. has been equipped with electric motive power. Plans are afoot to operate the entire plant, including the rolling mill, by this means.

THURLOW, PA.—The Thurlow Steel Co. has let a contract for a 1-story, 100 x 210-foot plant.

WILKINSBURG, PA.—The Stahl Chemical Co., capital stock $20,000, incorporated by O. E. Stahl, Wilkinsburg, C. H. Waterhouse, H. H. Smith, E. S. Jenks, Pittsburgh, and W. A. Irvine, Aspinwall, Pa.

WILLIAMSPORT, PA.—The Keystone Talking Machine Co. is about to let a contract for a 1-story, 67 x 200-foot factory.

BRONXVILLE, N. Y.—The Leonard Electric Co. has let a contract for a 2-story, 83 x 154-foot building, to be devoted to the manufacture of electrical appliances.

BUFFALO.—International Acheson Graphite Co. plans to build an extension to its plant at Niagara Falls.

NEW YORK.—Newport News Shipbuilding & Dry Dock Co. is in the market for several machine tools.

NEW YORK.—The Bishop Gutta Percha Co., 420 East Twenty-fifth street, is taking bids on a factory addition.

NEW YORK.—The Pennsylvania railroad is preparing a list of machine tools which it shortly will submit for inquiries.

NEW YORK.—The Schoder & Lombard Stamp & Die Co. has been incorporated to build machinery; $10,000 capital stock; by J. C. Chamberlain, H. L. Lombard and R. F. Schoder, 251 Canal street.

NIAGARA FALLS, N. Y.—An explosion of a boiler, followed by fire, caused a loss of about $25,000 at the plant of the National Carbon Co.

ROCHESTER, N. Y.—The Defiance Check & Writer Corporation has been organized to

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manufacture check writers, addressing machines and other office devices. S. C. Ward, Rochester, is interested in the company.

SOLVAY, N. Y.—Pass & Seymour, Inc., is taking bids on a factory addition.

SYRACUSE, N. Y.—The Dynetto Electric Co., Wolf and Park streets, shortly will take bids on a factory addition.

SYRACUSE, N. Y.—The Justin Seubert Co., 506 South Clinton street, has plans in progress for a factory addition.

TARRYTOWN, N. Y.—Heavy damage was caused by fire at the plant of the Chevrolet Automobile Co.

TONAWANDA, N. Y.—The Buffalo Sled Co. expects to erect a $250,000 factory addition in the near future.

TONAWANDA, N. Y.—The Solvay Process Co. will build a battery of 60 by-product coke ovens at Tonawanda, adjoining the steel plant which is being constructed by the Wickwire Steel Co.

PLAINVILLE, CONN. — The Rockwell-Drake Co., recently organized, is having plans prepared for a factory building here which will contain about 12,000-square feet of floor space. The company will manufacture gages and ball bearings.

BRIDGEPORT, CONN. — The Bridgeport Savings bank will build a 1-story, 60 x 68-foot bank building at Main and State streets.

EAST HAMPTON, CONN.—The 2½-story building containing the finishing and assembling departments of the Gong Bell Mfg. Co., was damaged by fire.

HARTFORD, CONN.—The Hartford Special Machinery Co., has increased its capital stock from $50,000 to $100,000.

HARTFORD, CONN.—The J. W. Rockwell & Sons Co. has been incorporated; $50,000 capital stock; by John W. Rockwell, Richard C. Rockwell and George A. Hanum.

HARTFORD, CONN.—The New York, New Haven & Hartford railroad is building on Market street a 1-story, 33 x 80-foot steel building to be occupied by the Hartford Automobile Parts Co.

MECHANICSVILLE, CONN.—Plans are being prepared for an extension to the power plant of the Putnam Light & Power Co., which will include a 1,000-kilowatt turbine, boiler, oil feed pump, heater and condenser.

NEW BRITAIN, CONN. — The Hadfield-Swenson Co. has been incorporated to make aeroplanes and motors; $20,000 capital stock; by Bernet A. Swenson, Charles E. Hadfield and Ann E. Hadfield.

NEW HAVEN, CONN.—The Marlin Fire Arms Corporation has let a contract for a 1-story, 250 x 400-foot ammunition plant.

NEW HAVEN, CONN.—The Winchester Repeating Arms Co. has taken out a permit for the erection of a 5-story machine shop of fireproof construction, on Shelton avenue, to cost $314,693.

NEW LONDON, CONN.—The Mohican hotel will add three stories to its present building at a cost of $300,000, of brick, fireproof construction.

NEW LONDON, CONN. — The National Electric Bulletin Corporation has awarded a contract for a factory building to be erected at Fort Neck, near the shops of the New London Marine Iron Works, where it will make electric bulletin machines.

PUTNAM, CONN.—A contract has been awarded for a 3-story, brick, 50 x 90-foot trade school building in Putnam.

PUTNAM, CONN.—The Manhasset Mfg. Co. has increased its capital stock from $175,000 to $450,000 and will build a 2-story addition.

THOMPSONVILLE, CONN. — Mark W. Bushnell and Guy F. Bushnell have bought the controlling interest in the Standard Metal Works Co., of the James A. Colvin estate and reorganized the $75,000 corporation. The plant of the G. H. Bushnell Press Co., in which Mr. Colvin also had a controlling interest, will be sold soon.

WATERBURY, CONN.—A. M. Larson will build a warehouse and garage, of brick, concrete and steel, five stories, 95 x 100 feet, at the corner of Maple street and Maple avenue.

WATERBURY, CONN. — Plans have been drawn for a brick and stone, fireproof, 3-story and basement, 190 x 196-foot high school to cost $300,000, at Grove and Pine streets, for the city of Waterbury.

WINSTED, CONN.—The forging department of the Winsted Edge Tool Co., was badly damaged by fire.

BARRINGTON, R. I. — Plans are being drawn for a brick, 2-story and basement, 85 x 118-foot grammar and high school to cost $65,000, for the town.

BIDDEFORD, ME.—The Pepperell Mfg. Co. is building a reinforced concrete 8-story, 50 x 300-foot addition to its storehouse.

HOPE VALLEY, R. I.—The Nicholas & Langworthy Machine Co. has been sold to a new concern and will shortly be reopened for the building of machinery.

PAWTUCKET, R. I.—The United Wire & Supply Co., will increase its preferred stock to the authorized limit, $1,000,000, by adding $250,000 senior preferred and to increase the old preferred from $500,000 to $750,000. The increase provides funds for the erection of one big, modern plant to take the place of the present three outgrown plants.

PHILLIPSDALE, R. I.—The addition to the steel mill of the Washburn Wire Co. plant will have an open hearth furnace which will greatly increase the capacity.

PROVIDENCE, R. I.—Plans are being prepared for an addition to cost $135,000 to be used as a hospital ward building at the state insane asylum in Howard.

AKAWAM, MASS.—Plans are being prepared for a brick and stone, fireproof 3-story, 60 x 100-foot training school in Feeding Hills for Hampden county.

ASHLEY FALLS, MASS.—Fire damaged the plant of the Southern Berkshire Marble Co., with its machinery and other equipment, entailing a loss of about $200,000.

BOSTON. — The United Injector Co. is building a $30,000 addition to its factory at 23 Watson street.

BOSTON.—The Stamped Specialties Co. has been incorporated; $10,000 capital stock; by John R. Laukenau, F. Lester Viccaro and James Doughty.

BOSTON.—The Wright Electrical Contracting Co. has been incorporated; $10,000 capital stock; by William J. Wright, Armand C. Bang and James A. Barry.

BOSTON.—The Commercial Machine Co. has been incorporated; $300,000 capital stock; by Alexander Whitesides, Ralph C. Piper and Howard Stockton Jr.

BOSTON.—Plans are being drawn for a corrugated steel, 1-story, 70 x 300-foot building for the Vacuum Fumigating Co., the foundation of which is now being laid.

BOSTON. — The Trimount Leather Co. has been incorporated; $25,000 capital stock; by Charles Goldman, Albert K. Goldman, John S. Martin and Walter A. I. Widlansky.

BOSTON.—The Bailey Meter Co. has been incorporated; $350,000 capital stock; by E. Merrick Dodd Jr., Stafford F. Johnson and Stewart C. Woodsworth.

BOSTON.—The Thayer, Kohn & Beyer Co., iron and steel, has been incorporated; $10,000 capital stock; by Elisha N. Thayer, Edward A. Kohn and George J. Beyer.

BOSTON.—Bids have closed for an 8-story brick, 51 x 58-foot storage building at 40 and 42 Harrison avenue for David J. Donahue and Alfred H. Howard, to cost $75,000.

BOSTON.—The American Tire Fabric Co. has been incorporated; $1,000,000 capital stock; by Howard K. Wood, New York, Francis L. Auld, Boston, and John L. McIver, Mattapan.

BOSTON.—A contract has been awarded for a brick, concrete and steel fireproof 9-story, 80 x 140-foot warehouse to cost $90,000, for the Boston Wharf Co., at 51 to 61 Melcher street, South Boston, which has been leased by Crimmins & Peirce, wool merchants.

BOSTON.—A contract has been awarded for a brick and stone, 2-story and basement, 58 x 142 and 38 x 50-foot building at 16 to 28 Nashua street and 30 Billerica street, to cost $200,000, for a syndicate headed by Thomas A. Clarke, Brooklyn, which has been leased by the United States government for the north post office for 10 years.

BOSTON.—The Overland Stores Co. is building a 3-story and basement service station of brick, steel and reinforced concrete, 100 x 280 feet; a retail store of brick, steel and reinforced concrete, one story, 60 x 128 feet, and a warehouse, eight stories, 200 x 225 feet, at the corner of Brookline avenue and Butler street and at the corner of Commonwealth avenue and Deerfield street.

CAMBRIDGE, MASS.—Simplex Wire & Cable Co. has awarded contract for a reinforced concrete, 4-story, 72 x 107-foot warehouse and factory building, to cost $25,000, at the corner of Sidney and Pilgrim streets.

EAST CAMBRIDGE, MASS. — Bids have closed for a reinforced concrete and brick fireproof 7-story, 78 x 110-foot packing house for John P. Squire, Chicago.

EASTHAMPTON, MASS. — The West Boylston Mfg. Co. has awarded contract for a steel 4-story mill, 125 x 750 feet and dwellings for employes, at a cost of $350,000. The company has increased its capital stock by an addition of $1,000,000.

HOLYOKE, MASS.—Plans are being drawn for a central grammar school to cost $200,000, on Maple street, for the city of Holyoke.

LOWELL, MASS.—Fire in the building at Fletcher and Dutton streets, owned by the A. L. Brooks Co., and occupied by a number of wood-working concerns, caused between $80,000 and $90,000 damage.

LYNN, MASS.—The Campbell Electric Co. has started plans for the construction of a 4-story and basement, 60 x 100-foot electrical apparatus factory.

NEWTON, MASS.—The West Newton Co. has been incorporated to make electrical apparatus; $1,000 capital stock; by George P. Bullard, Roland F. Gammons and R. V. Collins.

NORTHBRIDGE, MASS.—Bids have closed for a brick, mill construction, 4-story 102 x 112-foot addition to the mill of the Paul Whitin Mfg. Co.

NORTH WOBURN, MASS.—A building at the New England Mfg. Co.'s plant, which was devoted to the manufacture of munitions, was damaged by fire.

SALEM, MASS.—William E. Gove is building a 1-story, 62 x 73-foot machine shop at 25 New Derby street.

SPRINGFIELD, MASS.—Edward Radding, Inc., has been incorporated to carry on a business of general building and construction; $100,000 capital stock; by Edward Radding, Theodore W. Ellis and Daniel J. Harrington.

WESTFIELD, MASS.—The Yankee Farm Tractor Co. has been incorporated to build

tractors; $50,000 capital stock; by Ernest R. Pendleton, Fred Schmidt and Charles P. Roberts.

WOBURN, MASS.—An explosion followed by fire in a building used for making explosives damaged the plant of the New England Mfg. Co., North Woburn, causing a $10,000 loss.

WORCESTER, MASS.—The Y. M. C. A. will erect a $300,000 building at 766 Main street, some time this year.

WORCESTER, MASS.—The Linde Air Products Co., New York, is enlarging its plant here, known as Branch 9, and adding new machinery.

WORCESTER, MASS.—The Worcester Nut Mfg. Co. has been incorporated; $100,000 capital stock; by Carl G. Tideman, Rose N. Tideman and Richard H. Ward.

WORCESTER, MASS.—The Worcester Machine Tool Co. has been incorporated; $25,000 capital stock; by John A. Barker, William P. Kerr and William F. Kelley.

WORCESTER, MASS.—The Standard Machinery Co. has been incorporated; $150,000 capital stock; by Arthur N. Whittemore, Carl J. Nyman and Clarence R. Streater.

WORCESTER, MASS.—B. S. Roy & Son Co. has been incorporated to make card grinding machinery, etc.; $10,000 capital stock; by Sylvanus B. Roy, W. A. Underwood and E. G. Norman.

WORCESTER, MASS.—The Stafford Iron Works, Inc., which began business last spring in a new building on Stafford street, has let a contract for a 2-story, 50 x 70-foot building to be located near the present plant. The company recently took over the Boston Art Metal Co. and consolidated the business of the latter company with its own.

LUDDINGTON, VT. — The Luddington Woodenware Co. will rebuild its plant which was recently damaged by fire, and will expend about $100,000 for new buildings and machinery. The main building will be a 3-story, 60 x 144-foot structure. A warehouse, two stories, 48 x 150 feet and a boiler house, 40 x 82 feet, to be covered with iron, will also be erected.

DERRY, N. H.—J. W. Dinsmore will build a 1-story, 50 x 70-foot addition to the garage of the Seavey Garage & Auto Supply Co., Crystal avenue, which will be used for a machine shop.

BANGOR, ME.—The Newman Motor Co. has been incorporated; $10,000 capital stock; by Neil E. Newman, Haven Sawyer and W. C. Sawyer.

PORTLAND, ME.—The Portland Vending Co. has been incorporated to make machines; $50,000 capital stock; by H. H. Russell and others.

PORTLAND, ME.—The Paradox Pump Co. has been incorporated; $10,000 capital stock; by Helen S. Leavitt, Clark B. Dunton and David E. Moulton.

PORTLAND, ME.—The Paige & Conary Co., has been incorporated to do building contracting, construction, etc.; $10,000 capital stock; by James E. Paige, Edmund W. Conary and Lauren M. Sanborn.

PORTLAND, ME. — A contract has been awarded for a 2-story and basement, 80 x 228-foot planing mill and a 1-story, 37 x 86-foot boiler house for the Delano Mill Co., on the St. James street extension, by the J. B. Brown estate, owner.

SACAO, ME.—The Scales Hardware Co., has been incorporated; $10,000 capital stock; by Eugene M. Scales, Mark B. Black and Ernest W. Genthener, Portland.

WATERVILLE, ME.—The $75,000 addition to the machine shop of the Maine Central railroad, which is 40 x 300 feet, has been completed.

## CENTRAL STATES

BURLINGTON, WIS. — John Reed has leased the Weithaus building on Dodge street and will remodel it for a commercial machine shop, to be ready for business about Feb. 1.

BUTTERNUT, WIS.—A franchise has been granted to W. J. Schultz of Butternut by the village council to establish and operate a commercial electric light and power plant. The E. M. Schultz Electric Lighting Co. has been organized to build a plant at once.

HILLSBORO, WIS. — The Hillsboro & Northeastern railroad is arranging to build an extension of its steam road from Hillsboro to Richland Center, Wis. The work will cost $500,000, which is being raised by an addition of $150,000 to the capital stock, permitting an issue of $320,000. Work will start about March 1.

MARSHFIED, WIS.—The Marshfield Iron Works has booked an order for castings which will make it necessary to work double time for an indefinite period.

MILWAUKEE.—The Harsh & Edmonds Shoe Co., 694 Hanover street, is preparing to expend $65,000 in additions and new equipment. Four stories will be added to the present 4-story factory, 50 x 160 feet. The work is in charge of Herman J. Esser, architect, 402 Camp building.

MILWAUKEE.—The Wisconsin Iron & Wire Works, 186-190 East Water street, has increased its capital stock from $30,000 to $80,000 and will invest nearly all of the new issue in the erection and equipment of a plant, to be located at Franklin and Booth streets. Plans are now being prepared. C. W. Norris is secretary.

NORTH MILWAUKEE, WIS.—The E. R. Wagner Mfg. Co. has increased its acpital stock; from $100,000 to $200,000. The increase in capital stock was to care for new business. No immediate improvements are contemplated.

OSHKOSH, WIS.—The Oshkosh board of public works is asking for bids until Jan. 31 for the construction of a filtration plant at the pumping station, according to plans prepared by Col. H. P. Allen, consulting engineer, Chicago, Ill. It is estimated that the installation will cost between $90,000 and $100,000.

RACINE, WIS.—Mayor T. W. Thiesen has recommended to the common council that provision be made at once for the erection and equipment of a municipal machine shop and city garage.

DETROIT.—The Ross & Young Machine Co. has increased its capital stock from $35,000 to $760,000.

DETROIT.—The Kerr Machinery & Supply Co. has increased its capital stock from $20,000 to $50,000.

DETROIT.—The Detroit Steel Package Co. has been incorporated; $100,000 capital stock; by Henry P. Wiedman, Charles Gloser and Gustave A. Mueller.

DETROIT.—The Haw Construction Co. has been incorporated to carry on business as builder; $15,000 capital stock; by Albert Engvall, Thomas Haw Jr., Ella Schleiss.

DETROIT.—The Michigan Arms Co. has been incorporated to manufacture arms of all kinds; $100,000 capital stock; by James W. Peebles, Louis C. Stanley and Frank L. Bayles.

LANSING, MICH.—The Gier & Dall Mfg. Co. has increased its capital stock from $100,000 to $500,000.

LANSING, MICH.—The Reliance Engineering Co. has increased its capital stock from $1,250,000 to $1,720,000.

LANSING, MICH.—The Reo Motor Car Co. has increased its capital stock from $4,000,000 to $10,000,000.

NORTH DETROIT, MICH.—The Russell Motor Axle Co. has increased its capital stock from $150,000 to $250,000. Henry B. Ledyard, Henry Russell and Henry W. Campbell are interested.

CHICAGO.—The Frost Maker Ice Machine Co. has been incorporated; $50,000 capital stock; by Everett P. Stroup, Frank J. Irving, 7129 Rhodes avenue, and Alfred M. Turner, 6016 Stoney Island avenue.

CHICAGO.—The New York Central railroad is in the market for a combination punch and shear, 48-inch stroke, to punch 1¼-inch plates and shear bars 1⅜ x 6 inches for its Englewood shops at Chicago.

GENEVA, ILL.—The Geneva Foundry & Machine Co. will build an additional foundry, 55 x 100 feet.

KANKAKEE, ILL.—The Burrill Mfg. Co. is building a factory for the manufacture of cement working implements and farm tools.

ALEXANDRIA, IND.—A $50,000 installation of machine tools at the American Steel Wheel Works, Alexandria, will be used for munition making. Joseph Zeigler, Anderson, Ind., is at the head of a company recently formed to promote the undertaking.

EVANSVILLE, IND.—The Evansville Safety Appliance Co. has been incorporated to manufacture and sell semaphores, crossing signals and appliances; $50,000 capital stock; by James P. Wilson, William M. Smith and others.

FORT WAYNE, IND.—The Midland Engineering Co. has been incorporated to carry on business as general constructor; $10,000 capital stock; by Charles L. Olds, Norman E. Olds and Perry G. Olds.

WASHINGTON, IND. — The Keith-Clark-Vance Co. has been incorporated to build farm implements and automobiles; $10,000 capital stock; by Louis H. Keith, Jacob G. Clark, William T. Vance.

ASHLAND, KY.—The United Gas & Fuel Co. will establish a $100,000 plant for the purpose of manufacturing gasoline and other petroleum products.

COLUMBIA, KY.—The Columbia Lighting Co. is in the market for a 40 or 50-horsepower oil engine.

DAWSON SPRINGS, KY.—The Dawson Springs Hotel & Sanitorium Co. will build a $300,000 plant, plans for which have been drawn by Carl B. B. Davis, Inter-Southern building, Louisville.

LOUISA, KY. — Arrangements are being made for the erection of a power plant by the Sandy Valley Light & Power Co., of which L. L. Stone is manager.

LOUISVILLE, KY.—The Henry Vogt Machine Co. is now ready to close for the purchase of a 1,000-ton hydraulic press for installation in its boiler department.

LOUISVILLE, KY.—The Jenkins Lubricating Co. has been organized to manufacture greases and other oil products; $325,000 capi-

tal stock. Warner Jones, of Paul Jones & Co., is in charge.

MORGANFIELD, KY.—An electric traction line is to be built by G. L. Drury, of Morganfield, and S. B. Anderson, Memphis, Tenn. It will run from Morganfield to Uniontown, Ky.

LOUISVILLE, KY.—The Kentucky Wagon Mfg. Co., of which R. V. Board is president, has completed arrangements for the manufacture of automobiles, which will be sold through a separate corporation.

PADUCAH, KY.—The Watts Mfg. Co. will establish a plant for the manufacture of a window ventilating device. The company has been incorporated with $25,000 capital stock.

PIKEVILLE, KY.—The Pikeville Planing Mill & Supply Co. is in the market for equipment for the manufacture of flooring. It is also planning to increase the capacity of its power plant.

WINCHESTER, KY.—The Premier Mfg. Co. will equip a factory for the manufacture of children's garments. The concern has $15,000 capitalization.

SOMERSET, KY.—The Swannanoa Hosiery Mills is purchasing equipment for a knitting plant. The company is capitalized at $30,000. F. P. Cornelison is manager.

HUNTINGTON, W. VA.—The plant of the Sanitary Mfg. Co., now located in Hamilton, O., will be moved to Huntington in the near future. Plans were made in Cincinnati recently for the transfer, and installation of new machinery which will cost $300,000. The company manufactures pottery used in lavatory and plumbing work.

WEIRTON, W. VA.—The Phillips Sheet & Tin Plate Co. is buying considerable equipment for installation in its strip steel mill., operated by the Weirton Steel Co., which will be arranged for the manufacture of hoops and bands. The company has purchased motors and generators from the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and will buy other necessary equipment.

AKRON, O.—The Rex Extinguisher Co. has increased its capital stock from $14,000 to $25,000.

CINCINNATI.—The Murdoch Mfg. & Supply Co. has purchased the site it now occupies on Plum street between Fourth and Fifth streets.

CINCINNATI.—The Reliance Paint Co. recently incorporated with $250,000 capital stock, will build a factory in Cincinnati. A site will be secured at once. Special paint making machinery will be needed.

CINCINNATI.—The C. M. Mockbee Mfg. Co. has leased the former plant of the American Galvanizing Works at 81 East Pearl street. The company makes wire rope fittings, and will increase its facilities by one third in its new location.

CINCINNATI.—The Union Gas & Electric Co. will build a central power house in the near future. The board of directors has definitely decided to go ahead with this project, but the site has not been secured nor plans prepared as yet.

CLEVELAND.—The Graveraet Steamship Co. has increased its capital stock from $10,000 to $200,000.

CLEVELAND.—The Triple Die & Tool Co. has been incorporated; $10,000 capital stock; by B. F. Mallory, F. A. Schmaltz, B. Schmaltz, L. R. Mallory and F. J. Schmaltz.

CLEVELAND.—The Elliott-Thompson Electric Co. has been incorporated; $20,000 capital stock; by J. N. Elliott, M. B. Elliott, James T. Thompson, J. P. Elliott and Ted Howard.

CLEVELAND.—The Chamberlain Mfg. Co. has been incorporated; $50,000 capital stock; by Henry C. Chamberlain, F. E. Stewart, E. M. Cowles, B. H. Dowd, C. H. Bambennet.

CLEVELAND.—The H. J. Walker Machine Shop & Foundry has been incorporated; $25,000 capital stock; by Isador Grossman, Clause W. Shimmom, H. B. Howells, Harry C. Gahn, and B. I. Roof.

CLEVELAND.—The Almond Mfg. Co. has been incorporated to build and deal in machinery; $10,000 capital stock; by John H. Price, E. E. Mynard, Phelps Crum, L. R. Beck and Cary R. Alburn.

CLEVELAND.—The Sheriff Street Market & Storage Co. has increased its capital stock from $1,000,000 to $2,000,000 and is having plans prepared for considerable enlargement of its cold storage facilities as well as for an addition and remodeling.

COLUMBUS, O.—The Buckeye Blower Co. has been incorporated; $5,000 capital stock; by R. M. Spencer, R. H. Berry, L. D. Harnett, G. C. Bowman and E. R. Reeves.

DEFIANCE, O.—The Defiance Water Works Co. has been incorporated; $150,000 capital stock; by Julian H. Tyler, Frank G. Crane, Louis H. Paine, Leland G. Gardner and Forrest Jeffries.

DRESDEN, O.—The Dresden Electric Light Co. has been incorporated; $10,000 capital stock; by Maxwell Frazier, Angie Frazer, Myrle S. Frazier, William S. Lemert, C. M. Hass and W. A. Walcutt.

PORTSMOUTH, O.—Announcement has come from the offices of the Whitaker-Glessner Co. that plans are being prepared for the installation of a series of cold rolling sheet mills. This addition will be erected on the property recently acquired at New Boston, O., where its plant is located.

SEVILLE, O.—The Union Chain & Mfg. Co. has increased its capital stock from $10,000 to $20,000.

SPRINGFIELD, O.—The Efficient Tools Co. has been incorporated; $25,000 capital stock; by Carl M. Stretcher, Donald Kirkpatrick, Raymond L. McIntire, Joseph B. Gaines, William D. McIntire, Paul C. Laybourne and John C. Breckenridge.

TOLEDO, O.—The Coiled Wire Products Co. has been incorporated; $50,000 capital stock; by W. J. Cavanaugh, H. C. Tillotson, Charles S. Lattin, Ray G. Spencer, and George R. Spencer.

WAPOKONETA, O.—The Abner Mfg. Co. has been incorporated to manufacture gas generators, water filters, etc.; $25,000 capital stock; by J. H. Goeke, R. B. Anderson, Charles F. Herbst, A. J. Brown, C. A. Syueve.

YOUNGSTOWN, O.—The New York-Cleveland Chemical Co. has purchased 50 acres of land for the erection of a plant, details of which have not been announced.

YOUNGSTOWN, O.—Joseph Buchheit, 318 Plum street, Youngstown, has been awarded the general contract for the erection of a 12-room school building in East Youngstown.

YOUNGSTOWN, O.—The Northern Mfg. Co. has been incorporated to manufacture metal products; $20,000 capital stock; by John P. Dillon, Marguerite Culinsky, H. H. Hamman, Paul L. Harvey.

## SOUTHERN STATES

SAN ANTONIO, TEX.—The International & Great Northern railroad announces it shortly will begin the construction of new shops here to cost about $250,000.

CHATTANOOGA, TENN.—The Thatcher Spinning Co., recently organized with $300,000 capital stock, will erect a building 180 x 300 feet. Herbert Thatcher is in charge of construction and equipment.

CHATTANOOGA, TENN.—Harrison Bros. & Co. will establish a plant for the manufacture of aluminum sulphate. The main office of the concern is in Philadelphia. The plant will cost $100,000.

CHATTANOOGA, TENN.—Lewis T. Walle has organized the Chattanooga Chemical Co., which will build a plant to manufacture carbolic acid. Work on the building has begun. The cost of the plant will be $150,000.

CHATTANOOGA, TENN.—The Tennessee Stove Works has let a contract for the erection of an additional building, and will add equipment to cost $40,000. J. L. Caldwell is president of the company, which will double its capacity.

JEFFERSON CITY, TENN.—The Knoxville Lumber & Mfg. Co. has purchased the plant of the S. B. Edgar Lumber Co. and will increase its capacity.

JELLICO, TENN.—The Diamond Hosiery Mill will purchase equipment for a knitting plant. Company has leased a building and is buying machinery, including motors. G. T. Whitlock is in charge.

NASHVILLE, TENN.—The grain elevator of Logan & Co. was damaged by fire recently with $70,000 loss.

NASHVILLE, TENN.—The Tennessee Extract Co. has been organized with $300,000 capital stock to manufacture tannic acid. A site has been secured.

NASHVILLE, TENN.—H. H. Mayberry has information regarding plans for the construction of a traction line from Gallatin to Springfield, Tenn.

NASHVILLE, TENN.—The Tennessee Water Co. has been organized with $600,000 capital stock by George D. Adams and others to develop water-power properties in Tennessee.

PARIS, TENN.—The People's Ice & Coal Co. will double the capacity of its ice factory, installing machinery to make 750 tons a day. A cold storage plant is also to be equipped.

SHARON, TENN.—The municipality has voted to issue $25,000 of bonds, and will establish a waterworks and electric light plant in the immediate future.

BIRMINGHAM, ALA.—A report has been circulated that the Yolande Coal & Coke Co. will build a by-product plant to cost about $600,000. There has been no definite or official inforamtion obtainable with regard to this improvement.

BIRMINGHAM, ALA.—According to report, the Alabama Great Southern railroad has purchased considerable property west of the city of Birmingham, and it is rumored that car shops and roundhouses will be constructed during the year. It is estimated that between $1,500,000 and $2,000,000 will be spent on the investment if the project is started.

BIRMINGHAM, ALA.—The Gulf States Steel Co., it is rumored, will build a by-product plant. There has been no official announcement made of the proposed improvement, but it is known that certain negotiations are pending. James Brown, president of the company, has announced that the addition of a machine and blacksmith shop at the Alabama City plant will cost about $50,000. Work will be begun at once on this project.

GADSDEN, ALA.—It has been officially announced that the Gulf States Steel Co. will erect a modern machine shop at its plant. Plans are being prepared and it is estimated that the shop will be about 75 x 200 feet, of brick and steel construction.

SAVANNAH, GA.—The Savannah Sugar Refining Co. has announced that a site has been purchased and a $3,000,000 refinery will be erected shortly.

## WESTERN STATES

AUGUSTA, KAS.—Black, Sivalls & Bryson, builders of steel oil tanks, Electra, Tex., have leased a plot of ground in Augusta and have had plans prepared for the construction of a plant.

POLSON, MONT.—The Mission Range Power Co. has been granted a right-of-way from the mountains east of Polson to the city of Polson. The company has a hydro-electric plant which will supply Polson and neighboring towns with light and power.

TWIN BRIDGES, MONT.—Wm. Walker, superintendent of the Betsy Baker mine, announces that a 20-ton stamp mill will be constructed at the mine in the spring.

DAVENPORT, WASH.—The Deer Trail Mining Co., owning properties north of Davenport, has bonded its property for $100,000 and will construct a mill and install a flotation process.

MILES, WASH.—The Crystal Mining Co. contemplates the installation of a concentrating plant in the spring.

PROSSER, WASH.—A preliminary survey has been made of falls of Yakima river for a proposed power plant dam.

SEATTLE, WASH. — The Hudson Bay Spokane, Puget Sound railroad has been incorporated with offices in Seattle by Frederick C. Fruth, Geo. T. Webster and Geo. A. Lumbard.

SEATTLE, WASH.—Capt. John L. Anderson, president of the Anderson Steamboat Co., has under consideration the construction of a new shipbuilding plant, including a dry dock.

SPOKANE, WASH. — The Northwestern Mines Development Co. has taken over old smelter at Keller, Ida., and other property and will install an electro-chemical process to run the mill.

SPOKANE, WASH.—The Brooklyn Mining Co. has been formed to take over and operate the Brooklyn in Phillipsburg, near Maxville, Mont. A 100-ton daily capacity mill will be erected.

TACOMA, WASH.—It is reported that additional construction at the Tacoma Smelter to cost about $500,000 has been authorized by the American Smelting & Refining Co., include a sulphuric acid and manufacturing plant and plant to reduce flue gas. Carl F. Buck will have charge of construction.

WALLA WALLA, WASH.—The Farmers' Union has declared in favor of a $50,000 bridge across Snake river at Strawberry island. Definite plans for financing the structure have not been made. C. F. Fowler, Central building, Sattle, is the engineer.

ASTORIA, ORE.—D. S. Ewart plans to start at once the installation of an electric light plant at James Jamieson ranch at Jewell.

DALLAS, ORE.—Commissioners of Marion and Polk counties have decided to withdraw present call for bids on Salem bridge and issue new call including plans for a steel structure not to exceed $160,000 in cost.

EUGENE, ORE.—L. C. Reynolds will construct a $10,000 shingle mill on the Suislaw river.

PORTLAND, ORE.—The plan of Crosset Western Lumber Co. is to add a new planing mill and electric power to replace steam, estimated cost $100,000.

SUTHERLIN, ORE.—The Roach Timber Co., Muscatine, Ia., has raised $300,000 to finance the first unit of the Sutherlin-Coos Bay railroad to extend 15 miles east of Sutherlin to large bodies of timber.

## CANADA

CALGARY, ALTA.—The Rumley Co., LaPorte, Ind., which is being reorganized, is contemplating the erection of a large plant in Calgary.

CALGARY, ALTA. — A waterworks plant and system will be constructed here to cost $3,000,000. G. W. Craig, city engineer, is preparing the plans.

NEWCASTLE, N. B.—The city will purchase a pump for its waterworks plant. D. A. Jackson is engineer.

HALIFAX, N. S.—The Halifax Tramway Co. will build additions to its plant to cost $500,000, including a complete gas plant and a machine shop 146 x 150 feet.

LUNENBURG, N. S.—Leonard G. Holder's foundry was damaged by fire with a considerable loss.

BRANTFORD, ONT.—The Motor Trucks, Ltd., has been incorporated with $500,000 capital stock, to build automobiles, trucks, motor cars, engines, machinery, etc.; by James Harley, Edmund Sweet, A. M. Harley and others of Brantford, Ont.

BRIDGEBURG, ONT.—The W. G. Edwards Co., Ltd., has been incorporated to manufacture machinery, tools and vehicles of all kinds, etc.; $40,000 capital stock; by William G. Edwards, Frank E. Jackson, Ward R. Krafft and others of Bridgeburg and Arthur C. Ross of Fort Erie, Ont.

CHATHAM, ONT.—The American Well Works Co. and the Gray-Dort Motor Co. have received certain concessions from the town and in return they will both build large factories in Chatham.

HAMILTON, ONT.—The Hammant Steel Car and Engineering Works is contemplating an addition to its plant.

HAMILTON, ONT.—The Dominion Steel Foundry Co. will make extensive additions to its plant, including the erection of four new buildings.

HAMILTON, ONT.—The Canadian Cartridge Co. is building an addition to its plant and will install equipment to cost $200,000. When the plant is finished $600,000 worth of machinery will be installed. F. W. Mathlie is president of the company.

KINCARDINE, ONT.—The Ontario People's Salt & Soda Co. will build an addition to its plant and install new machinery to cost about $15,000. Mr. J. Tolmie is manager.

LONDON, ONT.—An addition to cost $40,000 will be built to the plant of the London Gas Engine Co. W. H. Heard is owner of the plant.

LONDON, ONT.—The Parnell Baking Co., 75 Bruce street, will install new equipment in its plant to cost $25,000. Work will be started in the spring. E. Parnell is manager.

LONDON, ONT.—The Western Construction Co., Bank of Toronto building, will shortly commence the manufacture of cement blocks and is asking for prices and other information on the necessary machinery.

NIAGARA FALLS, ONT.—The Standard Crushed Stone Co., Ltd., will purchase a revolving steam shovel of 2 to 35 tons capacity.

PORT ARTHUR, ONT.—The Western Machinery Co., Ltd., has been incorporated to build machinery and tools; $40,000 capital stock; by Richard B. Robert, Peter D. Munroe and Angus McPherson, all of Port Arthur.

ST. CATHERINES, ONT. — The Precision Mfg. Co., Ltd., has been incorporated to manufacture tools, machinery and all articles from metal; $60,000 capital stock; by Arthur W. Varey, Roswell L. Smith, Joseph B. McAndrew and others of St. Catherines.

STRATFORD, ONT.—The McConkey-Bates Co. is contemplating the manufacture of corrugated iron vaults to be manufactured in the Corrugated Pipe Company's building. A. J. Bates is interested in the company.

TORONTO, ONT.—The Toronto Pattern Works, 65 Jarvis street, will purchase patterns in wood or metal.

TORONTO, ONT.—F. Rogers & Co., 1193 Queen street west, are in the market to purchase two gang saws and one planer.

TORONTO, ONT.—The William Davies Co. will build an ice house at the St. Lawrence market at a cost of $15,000.

TORONTO, ONT.—The Universal Tool Steel Co, Dufferin street, near Springhurst avenue, has received a permit to erect a 1-story brick addition to its factory to cost $7,000.

TORONTO, ONT.—The Canada Metal Co. will build an addition to its plant. The estimated cost of construction will be about $25,000.

TORONTO, ONT.—The plant of the Marin Corrugated Paper Box Co., 1000 Gerard street, East Toronto, was seriously damaged by fire with a loss of about $125,000.

TORONTO, ONT.—The Goldie and McCullock Co., Ltd., will purchase a 25 to 50-kilowatt, 250-volt direct-current, direct-connected generator, including an engine.

TORONTO, ONT.—The National Cash Register Co. of Canada has been incorporated to build cash registers; $1,000,000 capital stock; by Thomas Phelan, John M. Godfrey and John E. Corcoran, Toronto.

TORONTO, ONT.—The Consolidated Steel Co., Ltd., has been incorporated to build tools, machinery and to carry on business as iron founder; $100,000 capital stock; by William H. Beatty, Francis A. Hammond and Charles B. McClurg, all of Toronto.

TORONTO, ONT.—The G. R. Growe Steamship Co., Ltd., has been incorporated to build and operate steamship lines; $50,000 capital stock; by George M. Willoughly, 27 Willcocks street, Francis H. Hurley, 32 Aberdeen avenue, Harold L. Steele, all of Toronto, Ont.

WHITBY, ONT.—The Whitby Silk Mills, Ltd., will build a plant to cost $50,000.

MONTREAL, QUE.—The Grand Trunk railroad has commenced building its machine shop on Sebastopole street which was recently damaged by fire. New equipment will be required

MONTREAL, QUE.—The Shawinigan Laboratories, Ltd., has been incorporated to manufacture metals of all kinds, etc.; $25,000 capital stock; by Howard Murray, William S. Hart and others of Montreal.

MONTREAL, QUE.—The Eastern Canadian Copper Corporation, Ltd., has been incorporated; $990,000 capital stock; by Edgar T. Sill, Albert J. Perkins and others of Montreal to manufacture and prospect for iron, copper, lead and other metals.

MONTREAL, QUE. — The Inter-Ocean Auto Co., Ltd., has been incorporated to build automobiles, aeroplanes, engines, tools, etc.; $50,000 capital stock; by Thomas B. Gould, Duncan McDonald and others of Montreal.

QUEBEC, QUE.—The Shawinigan Electric Power Co. will build a transformer station in Quebec.

WEEDEN, QUE.—The plant of the Weeden Chemical Co. was damaged by fire with a loss of $10,000. The company will rebuild immediately and will require considerable equipment.

# IRON AND STEEL PRICES

**Corrected up to Tuesday noon**

## PIG IRON

(Deliver July 1.)

| | |
|---|---|
| Bessemer, valley | $20.50 to 21.00 |
| Bessemer, Pittsburgh | 21.45 to 21.95 |
| Basic, Pittsburgh | 19.45 |
| Basic, eastern Pa. | 19.00 to 19.50 |
| Basic, Buffalo | 20.00 |
| Malleable, Pittsburgh | 19.95 |
| Malleable foundry, Chicago | 19.00 |
| Malleable foundry, Philadelphia | 20.50 to 20.75 |
| Malleable foundry, Buffalo | 18.00 to 19.00 |
| No. 1X foundry, Philadelphia | 20.50 to 20.75 |
| No. 2 foundry, Pittsburgh | 19.95 |
| No. 2 foundry, Cleveland | 19.30 |
| No. 2 foundry, Ironton | 18.00 |
| No. 2 foundry, Chicago | 18.50 |
| No. 2X foundry, Philadelphia | 19.75 to 20.50 |
| No. 2X fdy., N. J. tidewater | 19.75 to 20.50 |
| No. 2X foundry, Buffalo | 18.00 to 19.00 |
| No. 2 plain, Philadelphia | 19.25 to 19.75 |
| No. 2 plain, N. J. tidewater | 19.25 to 19.75 |
| No. 2 plain, Buffalo | 17.50 to 18.50 |
| No. 2 southern, Birmingham | 14.50 to 15.00 |
| No. 2 southern, Cincinnati | 17.40 to 17.90 |
| No. 2 southern, Chicago | 19.00 to 19.50 |
| No. 2 southern, Phila. delivery | 19.50 to 20.00 |
| No. 2 southern, Cleveland | 18.50 to 19.00 |
| No. 2 southern, New York docks | 18.00 to 18.50 |
| No. 2 southern, Boston docks | 17.25 to 17.75 |
| No. 2 south. interior, New Eng. | 18.50 to 19.50 |
| No. 2 southern, St. Louis | 18.40 to 18.90 |
| Virginia No. 2X furnace | 17.25 to 18.00 |
| Virginia 2X, Philadelphia | 20.00 to 20.75 |
| Virginia 2X, Jersey City | 20.25 to 21.00 |
| Virginia 2X, Boston points | 20.50 to 21.25 |
| Gray forge, eastern Pa. | 18.50 to 19.00 |
| Gray forge, Pittsburgh | 19.45 |
| Gray forge, Birmingham | 14.00 |
| Silveries, 8 per cent, Jackson, O. | 25.00 |
| Silveries, 8 per cent, Chicago | 26.50 to 27.50 |
| Low phos. Standard, Phila. | 32.50 |
| Low phos., Lebanon, Pa. | 29.00 to 31.00 |
| Low phos., Pittsburgh | 30.00 to 31.00 |
| Charcoal, Lake Superior, Chgo., Skelp, sheared | 36.00 |
| Skelp, grooved | 38.00 |
| Nos. 1 to 4 | 19.25 to 22.25 |
| Charcoal, Buffalo | 19.00 to 20.00 |
| Charcoal, Birmingham | 21.50 |

## IRON ORE

**Lake Superior Ores.**

(Lower Lake Ports.)

| | |
|---|---|
| Old range Bessemer, 55 per cent, ton | $4.45 |
| Mesabi Bessemer, 55 per cent, ton | 4.20 |
| Old range non-Bessemer, 55 per cent, ton | 4.50 |
| Mesabi non-Bess., 51½ per cent, ton | 3.55 |

**Eastern Ores.**

(Per unit delivered eastern Pennsylvania.)

| | |
|---|---|
| Pt. Henry fur., 60 per cent, unit | 8.6c to 8.9c |
| Local N. Y. and N. J. ores, unit | 8.5c to 8.75c |
| Port Henry lump, at mines, ton | $4.00 |

**Foreign Ores.**

(Per unit Philadelphia.)

(Prices nominal.)

| | |
|---|---|
| Foreign Bess., 50 to 65 per cent | 8 to 8½ |
| For'n non-Bess., 50 to 65 per cent | 8 to 8½ |

## COKE

**(At the ovens.)**

| | |
|---|---|
| Connellsville furnace | $3.00 to 3.25 |
| Connellsville fur., contract | 2.35 to 2.50 |
| Connellsville foundry | 3.75 to 4.00 |
| Connellsville fdy. contract | 3.00 to 3.25 |
| Wise county furnace | 2.85 to 3.10 |
| Wise county foundry | 3.25 to 3.50 |
| Pocahontas furnace | 2.75 to 3.00 |
| Pocahontas foundry | 3.00 to 3.25 |
| New River, foundry | 3.25 to 3.75 |
| New River, furnace | 3.00 to 3.25 |

## FERRO ALLOYS AND STEEL MAKING METALS

| | |
|---|---|
| Ferro mang., delivered (prompt) | $150 |
| Ferro mang., Balti., (future) | 125 |
| Spiegeleisen 20 per cent, furnace | 30.00 |
| Ferro-silicon, 50 per cent, Pbgh. | 83.00 to 85.00 |
| Ferro-silicon, 50 per cent, Phila. | 83.00 to 85.00 |

Bessemer ferro-silicon, 9 per cent to 10 per cent, $27.00; 10 to 11 per cent, $28.00; 11 to 12 per cent, $29.00; 12 to 13 per cent, $30.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-chrome, 4 to 6 per cent carbon, 25 cents per pound; 2 per cent carbon, 45 cents per pound, delivered.

Ferro-vanadium, $3.15 per pound of contained alloy, Pittsburgh.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

Nickel, 50 to 55 cents per pound.

Ferro-tungsten, nominal.

Cobalt metal, nominal, Pittsburgh.

Aluminum, 59 to 60 cents per pound, New York.

Ferro-molybdenum, Pittsburgh, nominal.

## Freight Rates via Panama Canal

Rates on finished materials, including plates, shapes, bars, wire, nails, etc., to Pacific coast points via Panama canal, per 100 lbs., in carload lots, exclusive of insurance and dockage.

| | |
|---|---|
| From New York | $0.40 |
| From Pittsburgh | .619 |
| From Youngstown | .619 |
| From Niles | .619 |
| From Wheeling | .619 |
| From Steubenville | .619 |
| From Johnstown | .604 |
| From Coatesville | .545 |
| From Steelton | .555 |
| From Bethlehem | .529 |
| From Cleveland | .65 |
| From Chicago | .765 |

## SEMI-FINISHED MATERIAL

| | |
|---|---|
| Open hearth billets, Phila. | $28.00 to 40.00 |
| Bessemer billets, Phila. | 33.00 to 35.00 |
| Forging billets, Phila. | 50.00 to 55.00 |
| Forging billets, Pbgh (nominal) | 55.00 |
| Forging billets, Chgo. | 50.00 to 55.00 |
| Wire rods, Pittsburgh (nom.) | 45.00 |
| Bess. billets, Youngstown | 33.00 to 34.00 |
| Open hearth billets, Youngstown | 35.00 |
| Bessemer billets, Pittsburgh | 34.00 |
| Open hearth billets, Pittsburgh | 35.00 |
| Bess. sheet bars, Youngstown | 34.00 |
| Op. h'th sheet bars, Youngstown | 35.00 |
| Bess. sheet bars, Pittsburgh | 34.00 |
| Op. h'th sh. bars, Pbgh. | 35.00 |
| Muck bar, Pittsburgh (nominal) | 34.00 |

## RAILS AND TRACK MATERIAL

| | |
|---|---|
| Stand. Bess., rails, Pbgh. & Chg. | 1.25c |
| Stand. op-h'th rails, Bbg. & Chg. | 1.34c |
| Light rails, 8 to 10 lbs., Pbgh. | 1.70c |
| Light rails, 8 lb., Chgo. | 1.58c |
| Light rails, 12 to 14 lbs., Pbgh. | 1.65c |
| Light rails, 12 lbs., Chgo. | 1.53c |

## Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—

| | |
|---|---|
| Cleveland | $0.95 |
| Newark, N. J. | 2.98 |
| Boston | 3.18 |
| Philadelphia | 2.78 |
| Pittsburgh | .95 |
| St. Louis | 3.18 |
| Buffalo to:— | |
| Albany, N. Y. | $1.26 |
| New England (all rail) | 2.58 |
| New York and Brooklyn (all rail) | 2.58 |
| New York and Brooklyn (by canal) | 1.25 to 1.60 |
| Virginia furnaces to:— | |
| Boston docks (r. and w.) | $3.05 |
| New England (all rail) | 3.25 |
| New York dock (r. and w.) | 2.88 |
| Birmingham, Ala., to:— | |
| Cincinnati | $2.90 |
| Chicago | 4.00 |
| Cleveland | 4.00 |
| Louisville, Ky. | 2.65 |
| New York (all rail) | 6.15 |
| New York (r. and w.) | 4.25 |
| Philadelphia (all rail) | 5.20 |
| Philadelphia (r. and w.) | 4.00 |
| Pittsburgh | 4.90 |
| Savannah, Ga. | 2.75 |
| Chicago to:— | |
| Des Moines | $2.80 |
| Milwaukee | .50 |
| Moline, Ill. | 1.40 |
| Omaha | 3.58 |
| St. Louis | 1.58 |
| Ironton and Jackson, O., to:— | |
| Chicago | $2.54 |
| Cincinnati | 1.26 |
| Cleveland | 1.62 |
| Detroit | 1.81 |
| Indianapolis | 1.58 |
| Light rails 16 to 20 lbs., Pbgh. | 1.60c |
| Light rails 16 to 20 lbs., Chgo. | 1.48c |
| Light rails 25 to 45 lbs., Pbgh. | 1.55c |
| Light rails 25 to 45 lbs., Chgo. | 1.43c |
| Relaying rails, standard, Pbgh. & Chgo. | $23.00 to 24.00 |
| Relaying rails, light, Chgo. | 21.50 to 22.50 |
| Angle bars, st. sect., Pbgh. base | 1.50c to 1.75c |
| Angle bars, st. sections, Chicago | 1.50c to 1.75c |
| Spikes, railroad, Pbgh. | 2.10c |
| Spikes, railroad, Chgo. | 2.20c to 2.35c |
| Track bolts, Pbgh. | 2.50c |
| Track bolts, Chgo. | 2.60c to 2.80c |
| Tie plates, Chgo. | 36.00 |

## SHAPES, PLATES AND BARS

| | |
|---|---|
| Structural shapes, Pbgh. (con.) | 1.85c to 2.00c |
| Structural shapes, Chgo. | 1.99c to 2.19c |
| Structural shapes, Philadelphia | 2.009c to 2.159c |
| Structural shapes, New York | 2.019c to 2.169c |
| Struc. shapes, San Francisco | 2.00c to 2.05c |
| Tank plates, Chgo. | 1.99c to 2.19c |
| Tank plates, Pbgh. (con.) | 1.85c to 2.00c |
| Tank plates, Philadelphia | 2.009c to 2.659c |
| Tank plates, New York | 2.019c to 2.669c |
| Bars, soft steel, Pittsburgh | 1.85c to 2.00c |
| Bars, soft steel, Chgo. | 1.99c to 2.19c |
| Bars, soft steel, Pbgh. (con.) | 1.85c to 2.00c |
| Bars, soft steel, New York | 1.969c |
| Hoops, carloads, Pittsburgh | 2.00c |
| Bands, Pittsburgh | 1.85c |
| Shafting, Pbgh., contr. carloads | 45 off |
| Bar iron, Chgo. | 1.75c to 1.80c |
| Bar iron, Philadelphia | 2.259c |
| Bar iron, New York | 2.269c |
| Bar iron, Cleveland | 1.90c to 2.00c |
| Bar iron, Pittsburgh | 2.00c to 2.10c |
| Hard steel bars, Chicago | 1.80c to 1.85c |

## SHEETS AND TIN PLATE

| | |
|---|---|
| No. 28, black, Pittsburgh | 2.60c to 2.75c |
| No. 28, black, Chgo. | 2.79c to 2.94c |
| No. 28, tin mill, black, Pbgh. | 2.50c |
| No. 28, galvanized, Pbgh. | 4.75c to 5.25c |
| No. 28, galvanized, Chgo | 5.19c |
| No. 10, blue anl'd, Pbgh. | 2.40c to 2.60c |
| No. 10, blue anl'd, Phila. | 2.659c to 2.759c |
| Tin plate, 100 lb., coke base | $3.75 |

## EXTRAS FOR SHEET OR TIN MILL SPECIFICATIONS

**(Per hundred pounds.)**

| | |
|---|---|
| Single picked, cold roll. and re-anld. | 30 cents |
| Hot roll'd pick'd and anl., tin mill | 25 cents |
| Full pickled, cold rolled and re-anld. | 50 cents |
| Auto sheets | 75 cents |
| Blued stove pipe stock | 10 cents |
| Range steel | 30 cents |
| Re-squaring | 10 cents |
| Roller leveling | 10 cents |
| Patent leveling and re-squaring | 35 cents |
| Oiling sheets | 10 cents |
| Deoxiding | 10 cents |
| Lime finish | 10 cents |
| Open-hearth stamping steel, free fr. mill scale | 55 cents |
| Special open hearth deep stpg. steel, free from mill scale | 80 cents |
| Extra deep special auto body stock | 1.25 |
| Ext. for 28 gage ov. 32 to 36-in. wide | 10 cents |

No reduction for sheets not annealed.

The above extras apply on both sheet and tin mill specifications, at the same rate.

## IRON AND STEEL PIPE

(Pittsburgh.)

| | Black. Butt-weld. | Galv. Butt-weld. |
|---|---|---|
| Steel, ¾ to 3 inches | 77 | 62½ |
| Iron, ¾ to 1½ inches | 68 | 50 |
| | Lap-weld. | |
| Steel, 2½ to 6 inches | 77 | 62½ |

## BOILER TUBES

| | |
|---|---|
| Steel, 3½ to 4½ inches l. c. l. | 66 |
| Iron, 3½ to 4½ inches l. c. l. | 56 |

## WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotation.)

| | |
|---|---|
| Wire nails, jobbers' Pittsburgh | $2.10 |
| Plain wire, jobbers, Pittsburgh | 1.95 |
| Galvanized wire, jobbers, Pittsburgh | 2.65 |
| Polished staples, Pittsburgh | 2.25 |
| Galvanized staples, Pitts. | 2.95 |
| Barb wire, painted, jobbers, Pbgh. | 2.25 |
| Barb wire, galv., jobbers, Pbgh. | 2.95 |

# IRON AND STEEL PRICES

**Corrected up to Tuesday noon**

## BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled threads, 70 and 12½; cut threads 70 and 5; larger or longer, 65.

Machine bolts with hot pressed nuts, ⅜ x 4 inches, smaller or shorter, rolled 70, 10 and 7½; cut, 70 and 12½; larger or longer, 65 and 10.

Gimlet and cone point lag bolts, 75 and 15. Hot pressed square, blank or tapped nuts, $4.50 off list; hot pressed hexagon blank or tapped, $4.70.

Cold pressed square, blank or tapped, $4.50 off; hexagon, blank or tapped, all sizes, $5.70.

## RIVETS

| | |
|---|---|
| Structural rivets, Pbgh | 2.60c |
| Structural rivets, Chgo. delivery | 2.75c |
| Boiler rivets, Pbgh | 2.70c |
| Boiler rivets, Chgo. delivery | 2.85c |

## STEEL SHEET PILING

(Pittsburgh.)

| | |
|---|---|
| Base sizes | 1.85c |

## STANDARD STEEL CHAIN

| | |
|---|---|
| Chain, ⅜ inch proof coil | 3.65c to 3.75c |

## COLD ROLLED STRIP STEEL

(Subject to regular extras.)

| 0.10 to 0.19 Carbon. | Base price Cut to length | |
|---|---|---|
| 1½ inch and wider. | Hard. | Soft. |
| 0.100 and thicker | 3.85 | 4.10 |
| 0.050 to 0.099 inc | 3.95 | 4.20 |
| 0.035 to 0.049 inc | 4.10 | 4.35 |
| 0.031 to 0.034 inc | 4.45 | 4.75 |
| 0.025 to 0.030 inc | 4.60 | 5.00 |
| 0.020 to 0.024 inc | 4.80 | 5.20 |
| 0.017 to 0.019 inc | 4.70 | 6.20 |
| 0.015 and 0.016 | 6.10 | 6.60 |
| 0.013 to 0.014 inc | 6.95 | 7.45 |
| 0.012 | 7.55 | 8.05 |
| 0.011 | 7.90 | 8.50 |
| 0.010 | 8.25 | 8.75 |
| | Coils. | |
| 0.100 and thicker | 3.75 | 4.00 |
| 0.050 to 0.099 inc | 3.80 | 4.05 |
| 0.035 to 0.049 inc | 3.95 | 4.20 |
| 0.031 to 0.034 inc | 4.10 | 4.50 |
| 0.025 to 0.030 inc | 4.20 | 4.60 |
| 0.020 to 0.024 inc | 4.30 | 4.70 |
| 0.017 to 0.019 inc | 4.50 | 5.10 |
| 0.015 and 0.016 | 5.00 | 5.50 |
| 0.013 and 0.014 | 5.70 | 6.20 |
| 0.012 | 6.05 | 6.55 |
| 0.011 | 6.40 | 6.90 |
| 0.010 | 6.75 | 7.25 |

## CAST IRON WATER PIPE

| | |
|---|---|
| Four-inch, Chicago | 30.50 to 31.00 |
| Six-inch and larger, Chicago | 28.50 to 29.00 |
| Six-inch Class B, New York | 29.00 |
| Four-inch, Class B, New York | 32.00 |
| Four-inch, Birmingham | 25.00 |
| Six-inch and larger, Birmingham | 23.00 |

Light weight water and gas pipe, $1 per ton higher than standard water.

## WAREHOUSE PRICES

| | |
|---|---|
| Steel bars, Chicago | 2.40c |
| Steel squares, 2-in. & ov., Cleve. | 2.65c |
| Steel rounds, 2 in. and over | 3.00c |
| Steel bars, under 2-in., Cleveland | 2.50c |
| Steel bars, Cincinnati | 2.45c |
| Steel bars, Philadelphia | 2.40c to 2.60c |
| Steel bars, New York | 2.50c |
| Steel bars, St. Louis | 2.45c |
| Steel bars, St. Paul | 2.50c |
| Steel bars, over 2-inch, Buffalo | 3.15c |
| Steel bars, Buffalo | 2.45c |
| Iron bars, Chicago | 2.30c |
| Iron bars, Cleveland | 2.45c |
| Iron bars, St. Louis | 2.40c |
| Iron bars, Cincinnati | 2.35c |
| Iron bars, Philadelphia | 2.40c |
| Iron bars, New York | 2.50c |
| Hoops, Chicago | 2.15c |
| Shapes and plates, Chicago | 2.50c |
| Shapes and plates, Cleveland | 2.50c |
| Shapes and plates, Buffalo | 2.45c |
| Shapes and plates, Cincinnati | 2.40c |
| Shapes and plates, St. Louis | 2.55c |
| Shapes and plates, Philadelphia | 2.40c |
| Shapes, New York | 2.50c |
| Plates, New York | 2.70 |
| Shapes and plates, St. Paul | 2.60c |
| No. 10 blue anl. sheets, Chgo | 2.70c |
| No. 10 blue anl. sheets, Clevel'd | 2.65c |
| No. 10 blue anl. sheets, Buffalo | 2.70c |
| No. 10 blue anl. sh., St. Louis | 3.00c |
| No. 10 blue anl. sheets, Cinci | 2.65c to 2.70c |
| No 10 blue anl. sheets, St. Paul | 2.80c |
| No. 28 black sheets, Chgo | 2.90c |
| No. 28 black sheets, Cleveland | 2.95c |
| No. 28 black sheets, Cincinnati | 3.00c |
| No. 28 black sheets, St. Louis | 3.20c |
| No. 28 black sheets, St. Paul | 3.25c |
| No. 28 galv. sheets, Chgo | 4.80c to 5.00c |
| No. 28 galv. sheets, Cleveland | 5.25c |
| No. 28 galv. sheets, Cincinnati | 5.25c |
| No. 28 galvanized sheets, St. L. | 5.25c |

## Freight Rates, Coke

| | |
|---|---|
| Connellsville district, per 2,000 lbs., to:— | |
| Baltimore | $1.80 |
| Buffalo | 1.85 |
| Chicago | 2.50 |
| Cleveland | 1.60 |
| Detroit | 2.10 |
| East St. Louis | 2.80 |
| Joliet | 2.50 |
| Louisville | 2.50 |
| Milwaukee | 2.85 |
| New York | 2.85 |
| Philadelphia | 2.05 |
| Pittsburgh | .75 |
| Richmond, Va. | 2.94 |
| Toledo | 1.85 |
| Valley Furnaces | 1.20 |
| Cincinnati | 2.00 |

## IRON AND STEEL SCRAP

(Net Tons.)

| | |
|---|---|
| Arch bars and transoms, Chgo. | $18.50 to 19.25 |
| Arch bars and transoms, St. L. | 16.50 to 17.00 |
| Cut forge, Chicago | 14.75 to 15.00 |
| Knuckles, coup., Chgo. | 15.50 to 16.00 |
| Knuckles, coup., St. L. | 14.50 to 15.00 |
| Locomotive tires, Chicago | 16.00 to 16.50 |
| Locomotive tires, St. Louis | 15.00 to 15.50 |
| Railroad wrought, No. 1, Chgo. | 15.00 to 16.00 |
| Railroad wrought, No. 1, Cleve. | 14.50 to 15.00 |
| Railroad wrought, No. 1, St. L. | 15.00 to 15.50 |
| Railroad wrought, No. 1, Cinci. | 12.25 to 12.75 |
| Railroad wrought, No. 2, Chgo. | 14.50 to 15.00 |
| Railroad wrought, No. 2, St. L. | 14.75 to 15.00 |
| Shafting, Chgo. | 17.25 to 17.75 |
| Shafting, St. Louis | 16.00 to 16.50 |
| Springs, Chgo. | 16.25 to 16.50 |
| Steel car axles, Chicago | 21.75 to 22.25 |
| Steel car axles, St. Louis | 22.00 to 23.00 |
| Pipes and flues, Chicago | 11.75 to 12.25 |
| Pipes and flues, Cleve'd (nom.) | 11.25 to 11.75 |

## Freight Rates, Finished Material

| From Pittsburgh, carloads, per 100 lbs. to:— | |
|---|---|
| New York | 16.9 cents |
| Philadelphia | 15.9 cents |
| Boston | 18.9 cents |
| Buffalo | 11.6 cents |
| Baltimore | 15.4 cents |
| Cleveland | 10.5 cents |
| Cincinnati | 15.8 cents |
| Chicago | 18.9 cents |
| Minneapolis and St. Paul | 32.9 cents |
| Denver | 68.6 cents |
| St. Louis | 23.6 cents |
| New Orleans | 30 cents |
| Birmingham | 45 cents |
| Pacific coast (all rail) | 73.9 cents |
| Pacific coast (tin plate) | 70 cents |
| Pacific coast, via Panama canal | 61.9 cents |

| | |
|---|---|
| Angle bars, iron, Chicago | 17.25 to 17.50 |
| Angle bars, iron, St. Louis | 15.50 to 16.00 |
| Angle bars, steel, Chicago | 14.00 to 14.50 |
| Angle bars, steel, St. Louis | 14.00 to 14.50 |
| Boiler plate, cut, No. 1, Chgo. | 11.50 to 12.00 |
| Boiler plate, cut, No. 1, St. L. | 7.00 to 7.50 |
| Boiler punchings, Chicago | 14.00 to 14.50 |
| Busheling, No. 1, Chicago | 13.00 to 13.50 |
| Busheling, No. 1, Cleveland | 13.75 to 14.25 |
| Busheling, No. 1, Cincinnati | 10.00 to 10.50 |
| Busheling, No. 1, St. Louis | 11.50 to 12.00 |
| Busheling, No. 2, Chicago | 9.25 to 9.75 |
| Bundled sheet, Cincinnati | 8.50 to 9.00 |
| Cast, No. 1, Chgo. | 13.50 to 14.00 |
| Cast, No. 1, Cleveland | 13.00 to 13.50 |
| Cast, No. 1, Cincinnati | 11.50 to 12.00 |
| Cast, No. 1, St. Louis | 9.50 to 10.00 |
| Cast borings, Chicago | 8.00 to 8.25 |
| Cast borings, Cleveland | 7.25 to 7.50 |
| Cast borings, Cincinnati | 7.50 to 8.00 |
| Cast borings, St. Louis | 7.50 to 8.00 |
| Machine shop turnings, Chgo. | 8.75 to 9.25 |
| Machine shop turnings, Cleveland | 6.75 to 7.00 |
| Machine shop turnings, Cinci. | 7.00 to 7.50 |
| Machine shop turnings, St. L. | 8.00 to 8.50 |
| Malleable agricultural, Chgo. | 12.00 to 12.50 |
| Malleable agriculture, St. Louis | 11.00 to 11.50 |
| Malleable railroad, Chicago | 14.00 to 14.25 |
| Malleable, Cincinnati | 8.00 to 8.50 |
| Malleable railroad, St. Louis | 12.50 to 13.00 |
| Pipes and flues, Chgo. | 11.75 to 12.25 |
| Pipes and flues, St. Louis | 10.50 to 11.00 |
| Stove plate, Chicago | 11.00 to 11.50 |
| Stove plate, Cleveland | 9.75 to 10.00 |
| Stove plate, Buffalo | 9.50 to 10.00 |
| Stove plate, Cincinnati | 8.00 to 8.50 |
| Stove plate, St. Louis | 10.00 to 10.50 |

(Gross tons.)

| | |
|---|---|
| Boiler plate sheared, Buffalo | 13.00 to 13.50 |
| Busheling, No. 1, Buffalo | 13.50 to 14.00 |
| Busheling, No. 1, Pbgh. | 14.50 |
| Busheling, No. 2, Buffalo | 11.00 to 11.50 |
| Bundled sheet, Pittsburgh | 14.50 to 14.75 |
| Bundled sheet, Cleveland | 12.50 to 12.75 |
| Bundled sheet, Buffalo | 12.00 to 12.50 |
| Car wheels (iron), Pittsburgh | 15.50 to 16.00 |
| Car wheels (steel), Pittsburgh | 19.00 to 19.50 |
| Car wheels, Chicago | 14.75 to 15.25 |
| Car wheels, eastern Pa. | 16.00 to 16.50 |
| Car wheels, Buffalo | 15.25 to 15.75 |
| Car wheels, N. Y. | 14.00 to 14.50 |
| Car wheels, St. Louis | 14.50 to 15.00 |
| Cast borings, New York | 9.50 to 10.00 |
| Cast borings, eastern Pa. | 11.50 to 12.00 |
| Cast borings, Buffalo | 9.25 to 9.75 |
| Cast borings, Pittsburgh | 10.75 to 11.25 |
| Cast, No. 1, eastern Pa. | 17.00 to 18.00 |
| Cast, No. 1, Pittsburgh | 15.00 to 15.50 |
| Forge, No. 1, eastern Pa. | 13.50 to 14.00 |
| Frogs, switches, guards, Chgo. | 15.50 to 16.00 |
| Frogs, switches, guards, St. L. | 16.00 to 16.50 |
| Grate bars, Buffalo | 11.00 to 11.50 |
| Grate bars, N. J. points | 11.00 to 11.25 |
| Heavy axle turnings, Buffalo | 12.00 to 12.50 |
| Heavy cast, No. 1, N. J. points | 14.50 to 15.00 |
| Heavy melting steel, Pbgh. | 17.50 to 18.00 |
| Heavy melting steel, Buffalo | 16.50 to 17.00 |
| Heavy melting steel, Chicago | 15.50 to 16.00 |
| Heavy melting steel, Cleveland | 15.25 to 15.75 |
| Heavy melting steel, Cincinnati | 14.25 to 14.75 |
| Heavy melting steel, eastern Pa. | 17.00 to 17.50 |
| Heavy melting steel, New York | 15.00 to 15.50 |
| Heavy melting steel, St. Louis | 16.00 to 16.50 |
| Iron rails, Chicago | 17.50 to 18.00 |
| Iron rails, Buffalo | 17.00 to 17.50 |
| Iron rails, Cincinnati | 14.00 to 14.50 |
| Iron rails, St. Louis | 16.00 to 16.50 |
| Iron axles, Pittsburgh | 27.00 to 28.00 |
| Iron axles, Cincinnati | 20.50 to 21.00 |
| Iron axles, eastern Pa. | 26.00 to 27.00 |
| Iron axles, Chicago | 22.75 to 23.25 |
| Iron axles, Buffalo | 23.00 to 23.50 |
| Iron axles, St. Louis | 15.00 to 15.50 |
| Iron rails, Cleveland (nom.) | 17.00 to 18.00 |
| Low phos. steel, Buffalo | 20.50 to 21.00 |
| Low phosphorus steel, Pbgh. | 21.50 to 22.00 |
| Low phos. steel, eastern Pa. | 21.00 to 22.00 |
| Machine shop turnings, Buffalo | 7.75 to 8.25 |
| Mall. railroad, Cleveland | 16.25 to 16.50 |
| Malleable railroad, Pittsburgh | 15.00 |
| Malleable railroad, Buffalo | 15.25 to 15.75 |
| Malleable railroad, eastern Pa. | 14.50 to 15.00 |
| Mch. shop turnings, New York. | 9.50 to 10.00 |
| Mch. shop turnings, Pbgh. | 10.25 to 10.50 |
| Mch. shop turnings, eastern Pa. | 11.50 to 12.00 |
| R. R. and mch. cast, No. 1, Bfl. | 15.25 to 15.75 |
| R. R. wrought, No. 1, Buffalo | 17.50 to 18.00 |
| Railroad wrought, No. 1, E. Pa. | 22.00 to 22.50 |
| R. R. wrought, N. 1, New York | 20.00 to 20.50 |
| Railroad wrought, N. 1, Pbgh. | 19.00 |
| Reroll. rails, 5 ft. & ov., Pbgh. | 18.25 to 19.00 |
| Reroll. rails, 5 ft. & ov., Chgo. | 17.75 to 18.25 |
| Reroll. rails, 5 ft & ov., Cleve. | 15.50 to 16.00 |
| Reroll. rails, 5 ft. & ov., E. Pa. | 19.00 to 20.00 |
| Reroll. rails, 5 ft. & ov., St. L. | 17.00 to 18.00 |
| Shafting, New York | 21.00 to 21.50 |
| Shafting, eastern Pa. | 23.00 to 23.50 |
| Shoveling steel, Chicago | 15.25 to 15.50 |
| Shoveling steel, St. Louis | 14.50 to 15.00 |
| Steel rails, short, Chicago | 17.00 to 17.50 |
| Steel rails, short, Cleveland | 18.00 to 18.25 |
| Steel rails, short, St. Louis | 16.00 to 16.50 |
| Steel car axles, New York | 19.00 to 20.00 |
| Steel car axles, Buffalo | 23.00 to 23.50 |
| Steel car axles, Cleveland | 22.00 to 23.00 |
| Steel car axles, eastern Pa. | 13.00 to 13.50 |
| Stove plate, N. J. points | 12.00 to 12.25 |
| Stove plate, Pittsburgh | 11.00 to 11.25 |
| Stove plate, eastern Pa. | 12.50 to 13.00 |
| Wrought pipe, New York | 14.00 to 14.50 |
| Wrought pipe, Buffalo | 13.00 to 13.50 |
| Wrought pipe, eastern Pa. | 16.00 to 16.50 |

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36

## Standardizing Air Furnace Practice

(*Continued from page* 144)

ent practice, where removable bungs are in use, the thickness cannot be much increased, as it is necessary to keep all parts of the brick through which the resultant pressure line passes, below the softening temperature of the brick used. The only improvement that the writer can suggest is to make the roof permanent and suspend it from one or more points between the skewbacks. This, of course, would necessitate charging from side doors.

Furnace operation starts with the mixture of pig iron, sprue, scrap, etc. This, so long a matter of mystery, is perhaps the simplest part of furnace operation; however, for best results it must be done along scientific lines. Having the analysis of the various materials, knowing what we desire to do, and with data from a few heats showing what elements are oxidized and to what extent, it is then a simple matter to make the mixture. The decision as to the final analysis of the heat is very important. It will depend largely upon the class of work. The writer's opinion is that the proper analysis should be about 2.50 per cent carbon and as much silicon as the heaviest section will carry without precipitating graphite.

The really difficult part of air furnace operation is in burning the proper amount of coal and adjusting the draft. Improper draft is the most frequent cause of failure. This subject is simple in theory, but seems to be difficult in practice. Starting with a properly designed furnace and a certain charge, we can find the amount of coal which should be burned. This amount of coal should then be shoveled in at frequent intervals. Air enough should be admitted under the grate to burn all the coal with a somewhat smoky flame and air enough should be admitted over the bridge wall to burn the fire box gases with a clear flame. Next, the opening at the neck should be adjusted to give a slight back pressure. The back pressure is right when the flame just tends to shoot out from the furnace openings.

If the malleable business is to be standardized on a basis of high quality we must know exactly what we desire to do and then do it in a thoroughly scientific manner. It is quite possible to have every heat poured of the right analysis and at the right temperature and this should be our constant aim. Proper annealing is so difficult that we cannot afford to complicate it by improper furnace operation.

## How to Test the Lenses of Goggles

(*Continued from page* 140)

fit the individual without danger of breakage. Joints to be secured by rivets, pins, solder or screws. Where frames are adjacent to the nose they shall be cupped, or otherwise designed so as to form a complete guard and leave no openings at these points for the entrance of foreign materials.

*Guards or Shields.*—Shields should be made of light, strong, durable material which may easily be kept in a sanitary condition. They should allow a clear vision in every direction, should have rounded edges and be shaped to fit the face closely without causing discomfort, but must not be sufficiently rigid or so shaped that they may cause injury if a severe blow should drive them into the temples. If wire screen is used it should be at least 40-mesh, but not fine enough so that it is easily distorted or jammed. If perforated metal is used the holes are to be not larger than 0.02-inch in diameter and shall not interfere seriously with the clear vision of the operator. It is important that proper ventilation be provided in a manner which does not defeat the function of the goggles. The complete goggle shall not weigh in excess of 71 grams or 2½ ounces. Each lens shall

bear a distinctive marking and the frame shall be marked with the name and address or trade mark of the manufacturer.

*Comfort Test*

In order to obtain a representative test of the practicability and adaptability of the goggles they should be tested as follows: Six observers are each given a pair of goggles which are to be worn for a period of one hour. Each observer is to be given the size of the goggle which best fits his face and the minor adjustments are to be made to secure as nearly a perfect fit as possible. At the end of the hour the observers will make a report as to their experience bearing upon the comfort of the goggles, especially at the following points: Back of ears, bridge of nose and temples.

*Hot Water Test*

Goggles must be subjected to boiling water or steam in order to sterilize. The following test indicates whether the samples may be expected to withstand extreme temperature changes without cracking: Goggles are to be immersed in cold water, temperature 10 degrees Cent. for 15 seconds and plunged immediately into boiling water, temperature approximately 100 degrees Cent. A failure of 10 per cent of the lenses so tested will result in the rejection of the entire lot of goggles.

*Corrosion Test*

Perspiration will corrode the metal portions of goggles to an objectionable degree unless they are made of materials, or provided with protective coatings, which resist corrosion. The following test is for the purpose of determining the ability of the goggle to resist corrosion: The goggle shall be immersed in a solution containing 10 per cent, by weight, of sodium chloride, for a period of 24 hours. Temperature of solution to be not less than 20 degrees Cent. nor more than 40 degrees Cent. at any time. Goggle should be removed from solution without wiping and allowed to dry for one hour. It is then to be examined for corrosion, and, if found to be seriously affected, the manufacturer must show that proper protection has been provided before the goggle may be recommended for labeling.

*Strength Test*

The frames must withstand the tests outlined herewith, without taking a permanent set:

1.—*Load perpendicular to plane of lens. Eight ounce test.*—The right lens is laid flat on the table top with nose bridge and left lens projecting beyond the edge of the table. A spring balance is connected to the outermost portion of the frame around the left lens and a force of 8 ounces (½ pound) is exerted in an upward direction. If the frame shows permanent set or distortion the goggle is rejected. If 25 per cent of the test lot fails to pass this test the lot is rejected.

2.—*Load applied in the plane of lens. Four-pound test.*—The right lens is held vertically in the hand and the lower edge of the left lens frame is pressed against the center of the pan of a balance which carries a weight of 4 pounds on the opposite pan. The pressure on the goggle frame must be exerted so that the weight is raised until the scale indicator reaches the balance position and may then be released. If the frame shows a permanent set or distortion the goggle is rejected. If 25 per cent of the test lot fails to pass this test the entire lot is rejected.

*Hot Metal Test*

Inasmuch as the goggles may be worn by men handling molten metal such as babbitt, etc., it is essential that they serve as safeguard against injury to the eye from this source and, therefore, must pass a test consisting of the dropping of 5 grams of molten lead, three times in each lens, from a height of 10 inches. No piece of glass shall leave the frames under these tests, or the entire lot shall be rejected.

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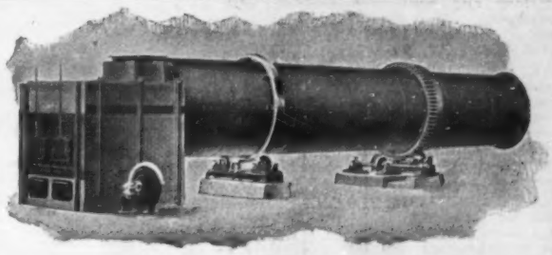
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**WANTED: — BUYER CONVERSANT** with general lines of iron and steel and heavy hardware, pipe and fittings, etc., as Manager, or Assistant Manager, for branch office. Some traveling would be necessary. Replies to receive attention must itemize previous experience, give references and state salary wanted. Address Box 721, THE IRON TRADE REVIEW, Cleveland, O.

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**PURCHASING AGENT AND OFFICE** MANAGER DESIRES CONNECTION WITH PROGRESSIVE CONCERN. 12 YEARS' EXPERIENCE IN OFFICE AND SHOP MANAGEMENT IN STRUCTURAL STEEL WORK AND KINDRED LINES; INCLUDING ACCOUNTING, CONTRACTING AND ESTIMATING. ADDRESS BOX 712, THE IRON TRADE REVIEW, CLEVELAND, O.

**TECHNICAL GRADUATE (29) ROD,** skelp, plate, blooming and cold mill experience. Former assistant master mechanic of large steel plant. At present superintendent of chemical Company. Address Box 717, THE IRON TRADE REVIEW, Cleveland, Ohio.

**WANTED: POSITION BY MECHANICAL ENGINEER.** Eighteen years' experience as die sinker and master mechanic. Address Box 716, THE IRON TRADE REVIEW, Cleveland, Ohio.

**WANTED: — POSITION AS TRAFFIC** manager.—Sober, steady, middle-age man, married, 17 years' railway experience in official capacity, wide experience in handling traffic matters before Interstate Commerce Commission and various State Commissions, familiar with rate situations in all territories, at present permanently employed, very best of references as to ability and character, desires permanent connection with manufacturing, jobbing or industrial concern. Address Box 710, THE IRON TRADE REVIEW, Cleveland, O.


**Mr. Manufacturer**

Here's the weekly exchange where Competent—wide-awake—industrious—men with initiative can be communicated with quickly.


## Positions Wanted

**FOREMAN NOW EMPLOYED, WISHES** to make change; have 20 years' experience as pattern maker and foreman, draftsman and designer; last four years in charge of designing, experimental and pattern departments with a large brass firm. Thoroughly up to date on modern shop practice. Address Box 707, THE IRON TRADE REVIEW, Cleveland, Ohio.

**BY - PRODUCT COKE OVEN EN**gineer—chemical and mechanical, nine years on construction, operation and repairs. Age 32, married and good references. Address Box 708, THE IRON TRADE REVIEW, Cleveland, Ohio.

**WHEN YOU NEED A HIGH GRADE** executive, engineer, draftsman, or any technical man, consult The Engineering Agency, Inc., (Est. 21 years) 1662 Monadnock Block, Chicago.

**A-1 FURNACE MAN, 15 YEARS BLOW**ing and General Foreman, desires to go with good concern. Best of references. Address Box 640, THE IRON TRADE REVIEW, Cleveland, O.

**WANTED: — POSITION AS BRASS** foundry foreman, 17 years as foreman. Competent in molding, coremaking, mixing of metals and making pattern plates for molding machines. A-1 references. Address Box 724, THE IRON TRADE REVIEW, Cleveland, O.

**CHEMIST, DESIRES POSITION IN** laboratory of concern in Milwaukee or near vicinity. Experienced on iron, steel, special steels, alloys, iron ores, etc. Address Box 683, THE IRON TRADE REVIEW, Cleveland, O.

**HIGH GRADE FOREMAN WITH FIRST** rate experience in foundry practice. Can mix by analysis. At present I have charge of a general jobbing shop. Heavy and light work. Prepared to talk business with the right parties. Address Box 695, THE IRON TRADE REVIEW, Cleveland, O.

**HIGH CLASS TRAVELING SALESMAN** with a large experience and following in Iron and Steel wants position. Address Box 394, THE IRON TRADE REVIEW, Cleveland, O.

**ADVERTISING MAN: 26, THOROUGHLY** experienced in trade paper advertising. Good copy writer and conservative executive. For personal reasons the writer wishes to leave his present employers who will recommend. Address Box 664, THE IRON TRADE REVIEW, Cleveland, O.

**THOROUGH MALLEABLE FOUNDRY**man experienced also on light and medium weight gray iron, having over 20 years practical experience abroad and states. Past ten years superintending some of the largest plants covering practically all classes of work, lowering costs, reducing percentage of scrap, materially increasing production. Would consider giving services for any period of time to foundries not operating satisfactorily. Further particulars address Box 686, THE IRON TRADE REVIEW, Cleveland, O.

**MASTER MECHANIC WANTS POSITION;** thoroughly experienced in constructing and operating rolling mills, open-hearth and blast furnaces; by-product coke ovens; water works, hydro-electric and turbo-generating plants; has machine shop practice; best references. Address Box 354, THE IRON TRADE REVIEW, Cleveland, O.